MODERN PLASTICS

E. F. LOUGEE, Editor
C. A. BRESKIN, Publisher
Dr. G. M. KLINE, Technical Editor

Of General Interest

Technical Section

News and Features

Next Month

Franklin Brill of General Plastics, Inc., will outline the use of plastic materials in the refrigerator industry. He will illustrate how, in the last few years, plastics have become No. 2 Refrigerator Material.

Gilbert Rohde, industrial designer, has used decorative laminated materials in his conference room and offices and has provided a unique arrangement of sliding panels to demonstrate color advantages of the material.

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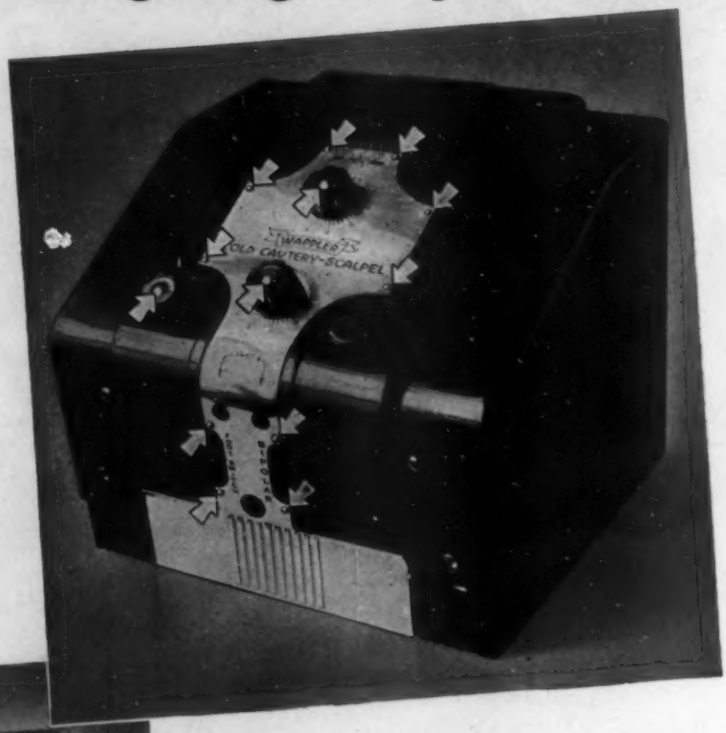
An Assembly Method that helped

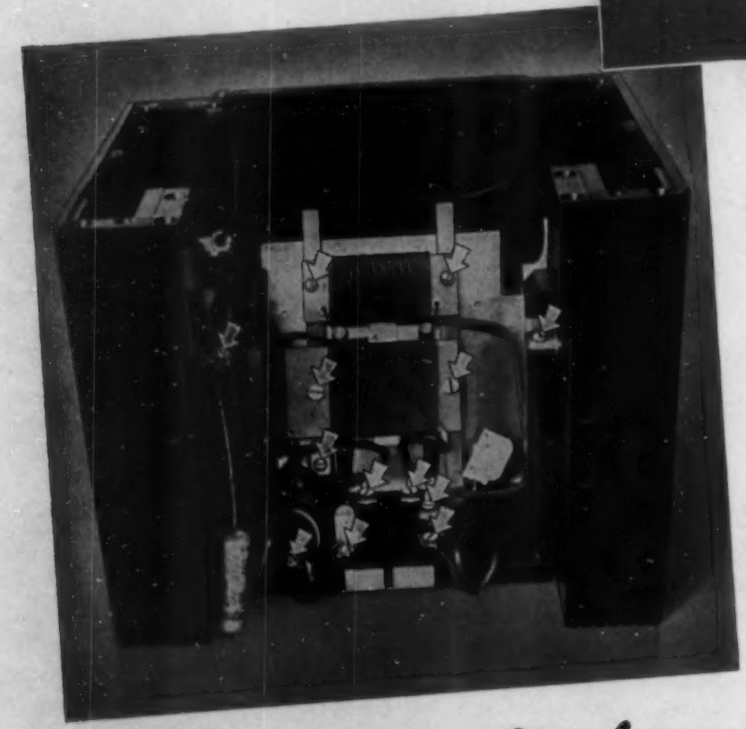
MAKE "A $250 PRODUCT" TO SELL AT $85

should be worth investigating for your work



AT ONE TIME doctors had to pay from $250. to $700. for a Cold-Cautery-Scalpel. Now they can get this efficient and reliable "Wappler" instrument for only $85. Even the country practitioner can own one since American Cystoscope Makers, Inc., applied mass production principles and intelligent thought to the design of such equipment.

In this achievement the maker states that Parker-Kalon Hardened Self-tapping Screws played an important part. "They enabled us to save quite a sum on the cost of molds because inserts in the plastic parts could be avoided . . . They simplified the attachment of parts to the molded housing, saving much assembly labor and greatly increasing production speed . . . The fact is that stronger fastenings also were secured, for these unique Screws hold more securely than machine screws in either inserts or tapped holes." It is no wonder that this manufacturer says—"Now when an assembly is to be made on any of our products we first consider Hardened Self-tapping Screws."



Let us help you investigate this cost-cutting method of assembling metal and plastics

On your own work it is likely that fastening jobs could be simplified and economies effected by using Hardened Self-tapping Screws in place of ordinary devices. In 7 out of 10 cases where metal or plastic assemblies are required this method can be used to advantage for all or part of the fastenings. A Parker-Kalon Assembly Engineer will call on request to go over your fastenings with you and point out all opportunities. A letter to us obtains this service without obligation.

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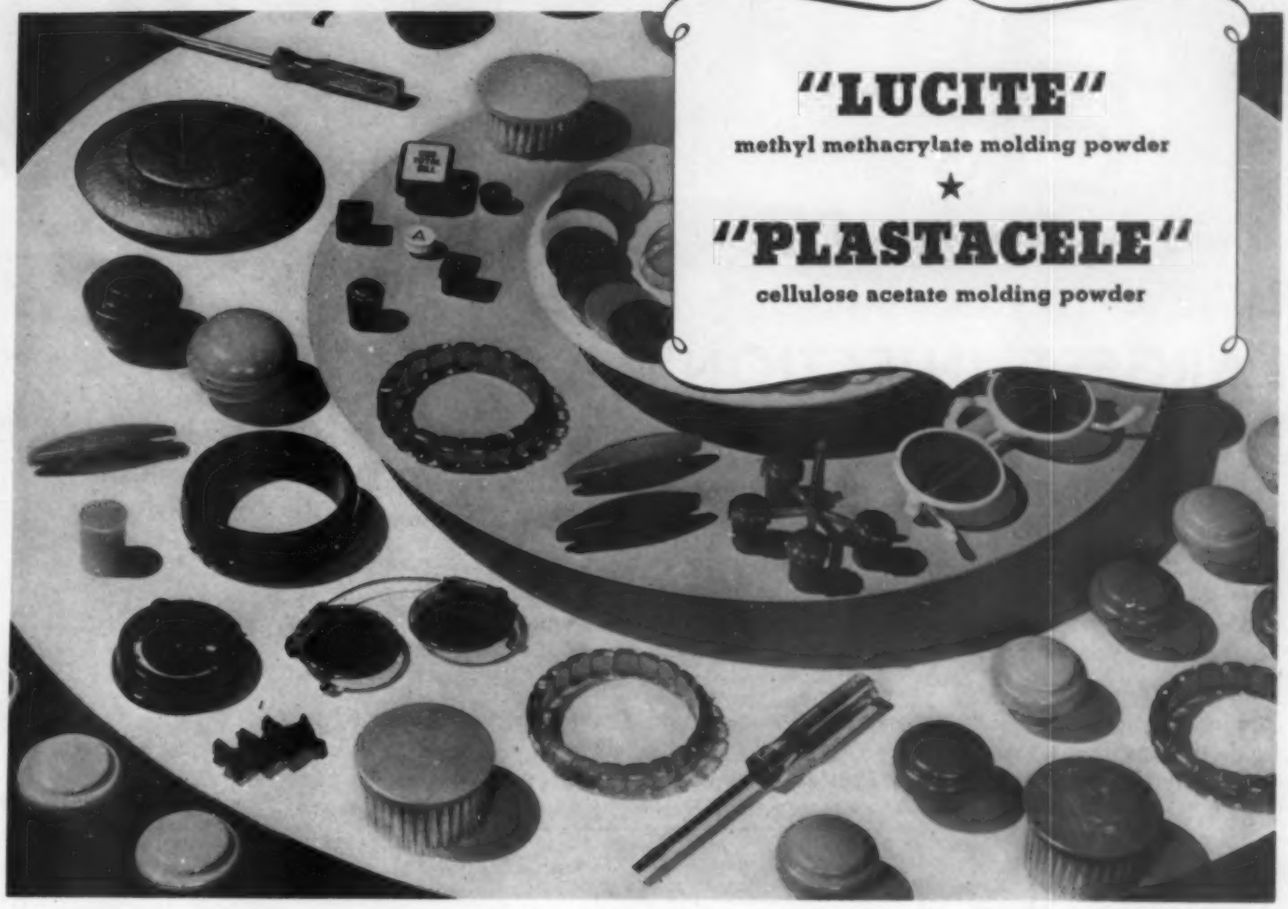
Du Pont offers two fine plastics



THE phenomenal increase in the use of plastics is due in no small degree to the enterprise of custom molders. The chemist develops the molding powder. The molder adapts it to the chemical requirements. It is this group who are constantly seeking new ways to produce the articles that are everywhere replacing products that were formerly made of metal, wood, rubber, glass, bone or pearl, because molded plastic parts are better, more beautiful and less expensive to the manufacturer.

Commercial molders know how to insure good production—how to avail themselves and their customers of the economies that injection and pressure molding with Du Pont Plastics insure in certain classes of articles.

Du Pont now provides two molding powders to meet these new markets. "Plastacele" cellulose acetate molding powder, and the spectacular new "Lucite" methyl methacrylate molding powder are in demand throughout the industry.

No one material can meet all the requirements of the trade. That is why Du Pont now provides six different types of plastic materials. Research in Du Pont laboratories is actively engaged in developing new plastics to fit the needs of this fast-growing industry.

Working closely with leading commercial molders, it is Du Pont's constant endeavor to help manufacturers in many lines to make their products better-looking, more useful and more economical to produce. If there is anything in this experience that can be made helpful to you, Du Pont will be pleased to serve. Consult your molder or write E. I. du Pont de Nemours & Co., Inc., Plastics Department, Industrial Division, Arlington, N.J. Booklets are available describing the characteristics and properties of these two molding powders.

AMONG DU PONT'S LINE OF PLASTICS ARE:

"Pyralin" cellulose nitrate plastic; "Plastacele" cellulose acetate plastic; "Phenalin" cast phenolic resin; "Lucite" methyl methacrylate resin. These four plastics are available in sheets, rods and tubes. For injection and pressure molding, there are: "Plastacele" cellulose acetate molding powder, and "Lucite" methyl methacrylate molding powder.

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PLASTICS

LARGEST INJECTION MOLDED BEZEL EVER MADE

Done on a Reed-Prentice No. 10 by Erie Resistor Corporation for RCA Manufacturing Company

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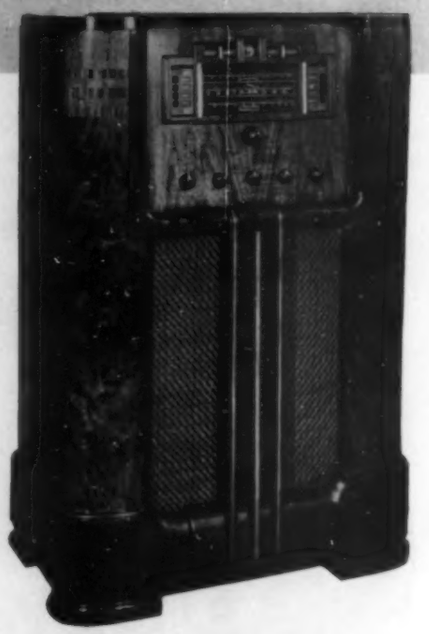
Introduced only a few months ago, already we are swamped with re-orders. One molder has installed a total of seventeen of these machines! Others have them in quantity up to a dozen! In short . . . their phenomenal performance and economy make it imperative that you, as a molder, investigate them today. Write—



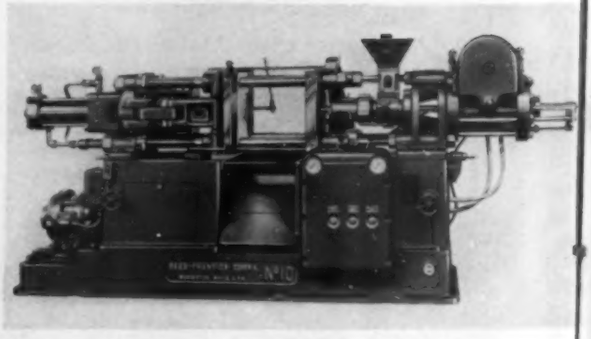
Other Construction Features

1. Molds are opened and closed and material is injected hydraulically.
2. Molds are rigidly locked by toggle mechanism.
3. Entire toggle end of machine is adjustable through screw mechanism.
4. Entire injection cylinder end of machine is adjustable through screw mechanism.
5. Machine when operated automatically is electrically controlled through three timing units adjustable from .2 of 1 second to 120 seconds.
6. Machine can be operated automatically on single cycle, using two of the timing controls.
7. When the machine is manually operated, it is controlled by two levers, one for closing the mold the other for operating the injection cylinder.
8. Machine is self-contained and base serves as oil reservoir.
9. Electric heating unit including two rheostats for heat control of material including automatic pyrometer furnished.
10. Die plates can be supplied to accommodate customer's molds and distance between die plates can be increased if desired to 24"; at extra cost.
11. Safety device and automatic knock-out for product provided.
12. All die plates and toggle construction made from steel castings.

Model No. 10A General Specifications

Capacity of Hopper Slide—7 c/in. Gran. Material, 2¾ c/in. moulded, 2 oz. moulded	
Estimated shots per hour—300 to 400, varying with type of part, 500 c/in. moulded material per hour, 24 lbs. per hour	
Pressure per sq. in. on material—2000 to 21,200 lbs.	
Maximum injection area of mould capacity—24 sq. in.	
Diameter of plunger—1¾"	
Stroke—7"	
Speed of Plunger Continuous 120 in. per minute.	
Approximate power consumption for heating unit	0.5 to 1.5 KWH
Size of die plates	18" × 20"
Capacity of feed hopper	20 lbs.
Space between bars	12" × 12"
Die Opening	8"
Maximum die space	18"
Minimum die space	6½"
Diameter of tie bars	2½"
Oil pressure	1000 lbs. sq. in.
Motor recommended	15 HP 1200 RPM
Floor Space	144" × 40"
Weight, approximately, exclusive drive motor	10,000 lbs.

Machine is heavily constructed throughout with highest grade materials and workmanship consistent with best machine tool practice and American production demands.



REED-PRENTICE New No. 10A

Automatic Full Hydraulic Injection Molding Machine

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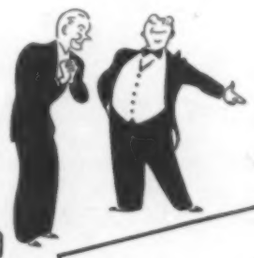
Get in touch with Celluloid. Let us show you (1) how Lumarith's colors can improve the product you have in mind, and (2) how best to use Lumarith in that product. So that we can give you intelligent cooperation, please make your inquiry as specific as possible. Celluloid Corporation maintains a fabricating division to test every new development in the application of Lumarith. These facilities are available for production as long as required.



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For heavy-duty preforming. More than a score in use. Low-power, toggle type; can't be jammed on centers. *Can't be smashed.* Ask for details.

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CHEMICAL AND SPECIAL PROCESS EQUIPMENT
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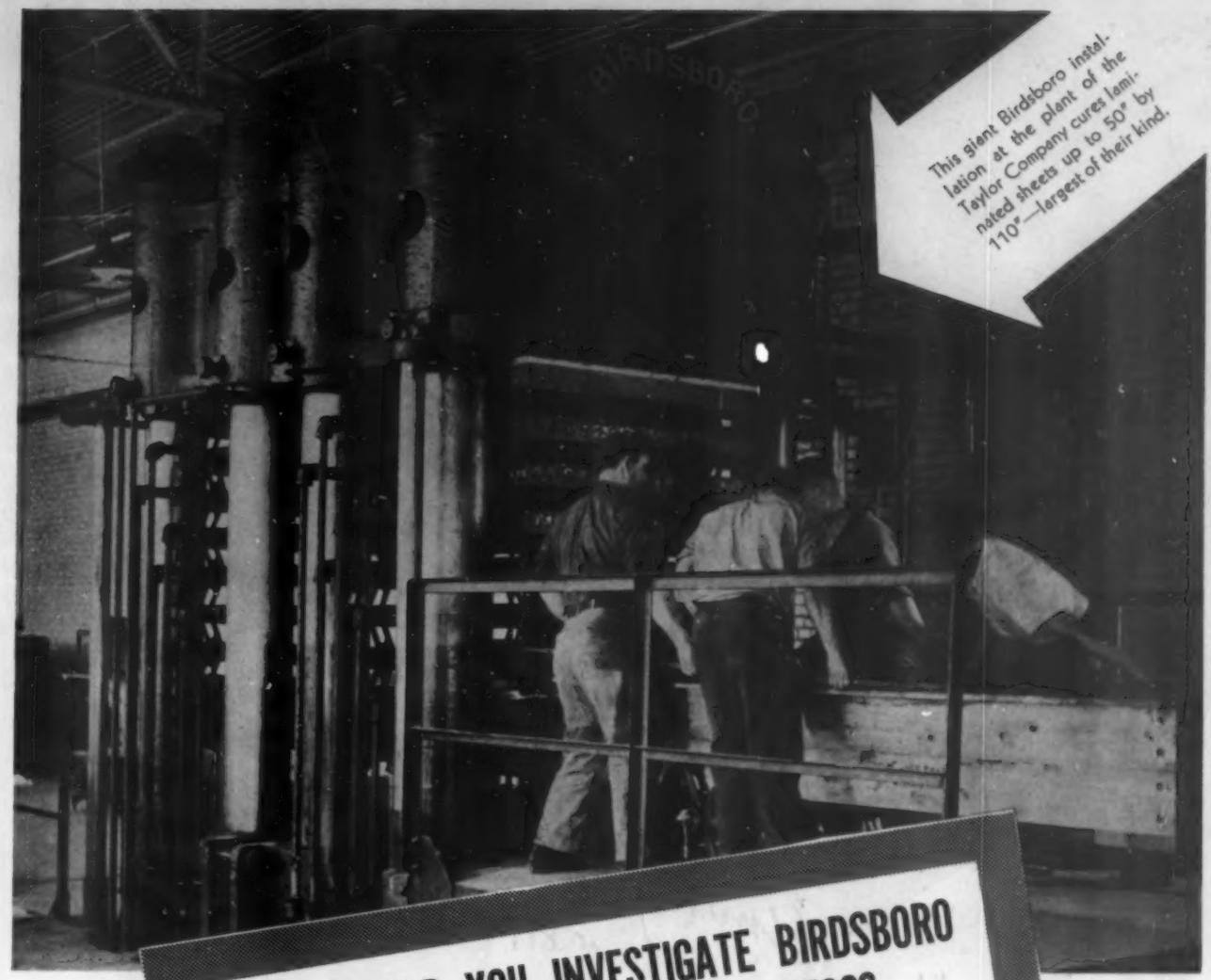

WHY SHOULD YOU INVESTIGATE BIRDSBORO BEFORE YOU BUY ANY PRESS?

Because Birdsboro makes every type of press used in the plastics industries . . . . laminating, sheet, molding, arbor, hobbing, extrusion, inlaying and laboratory types as well as hydraulic pumps, accumulators, operating and control valves, hose, tubing and other accessories.

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Because Birdsboro experience and designing skill, coupled with modern foundry and machine shop facilities, guarantees you a finer performance at the lowest possible cost.

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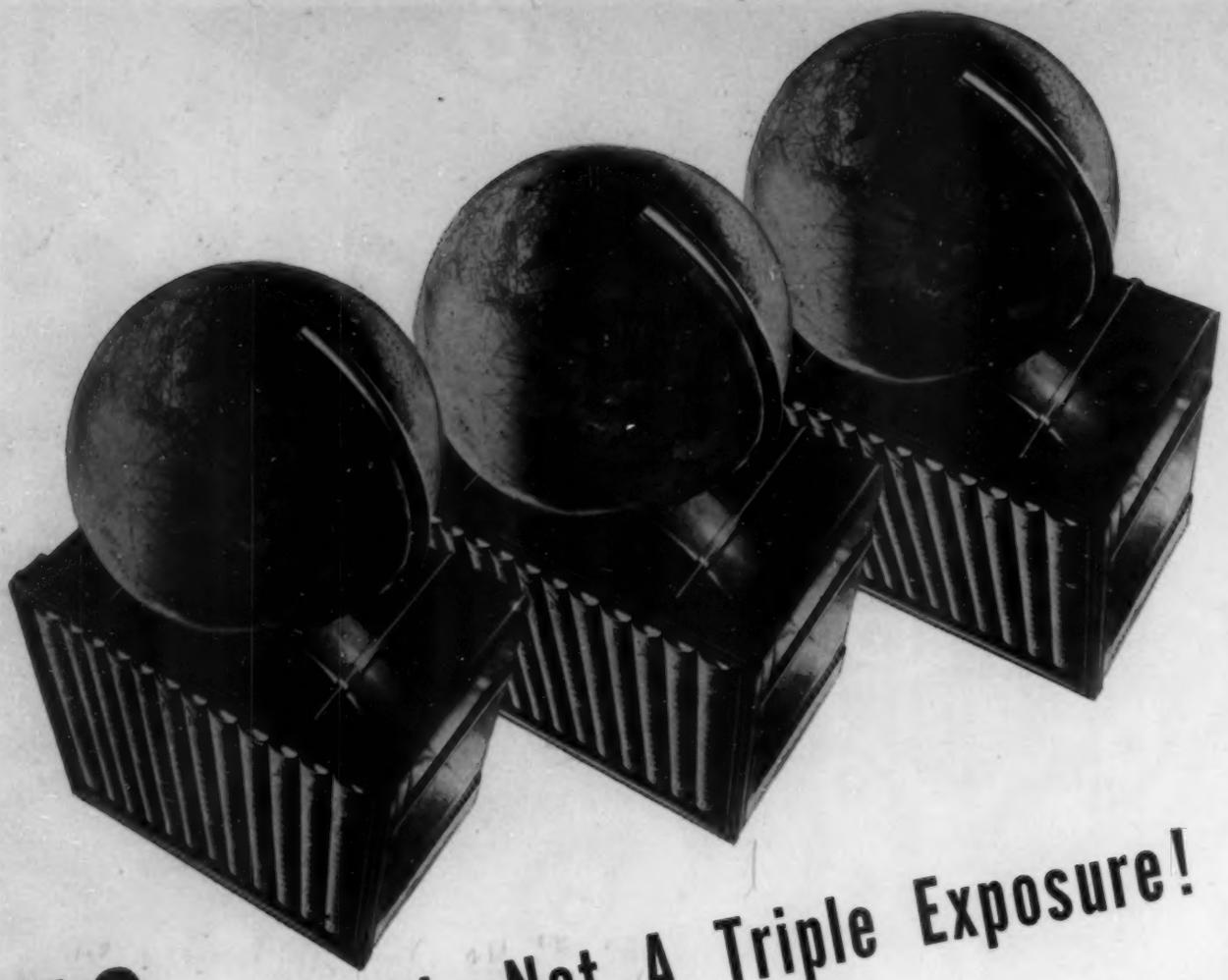

NO . . . It's Not A Triple Exposure!

Just our way of dramatizing the fact that you get triple production out of a given mold when Boonton does the molding.

Not that we're magicians. Merely that Boonton, for many years, has worked three shifts around the clock.

Of course that means an initial saving on molds. Because you can purchase a mold with fewer cavities when you use the mold more hours each day.

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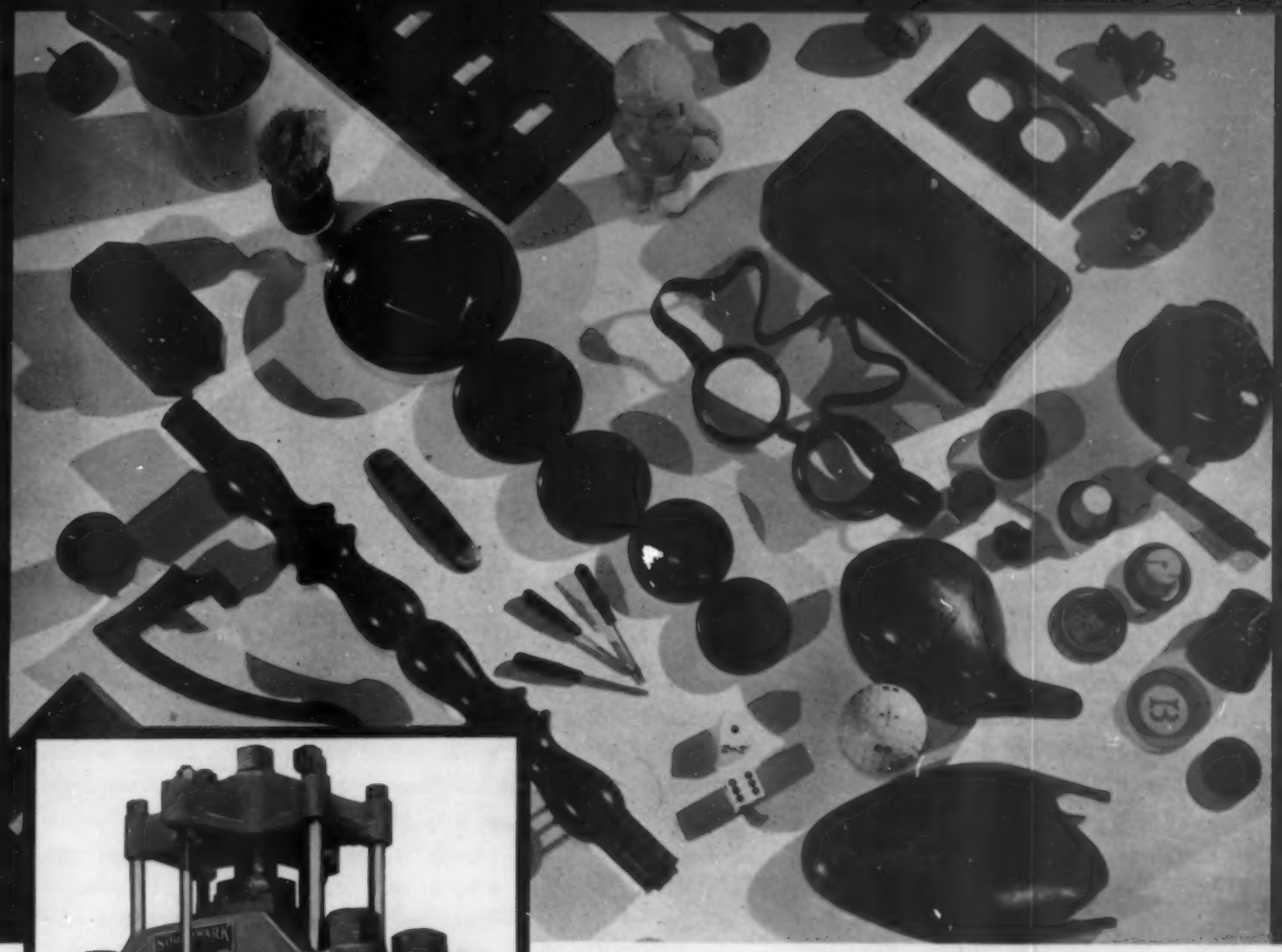

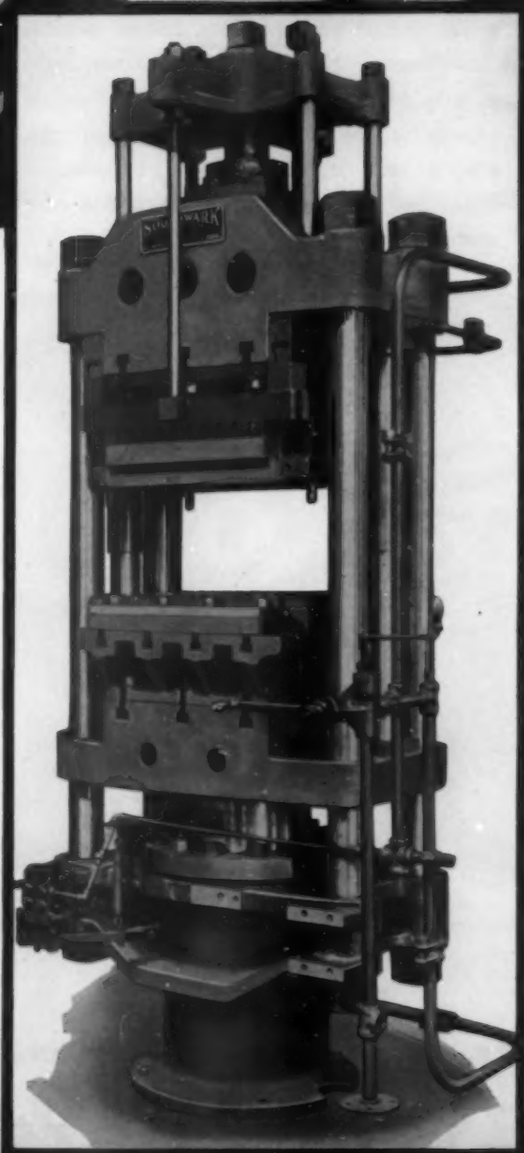

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We invite you to make full use of Southwark engineering and consultant services . . . to improve product quality . . . to lower production costs.

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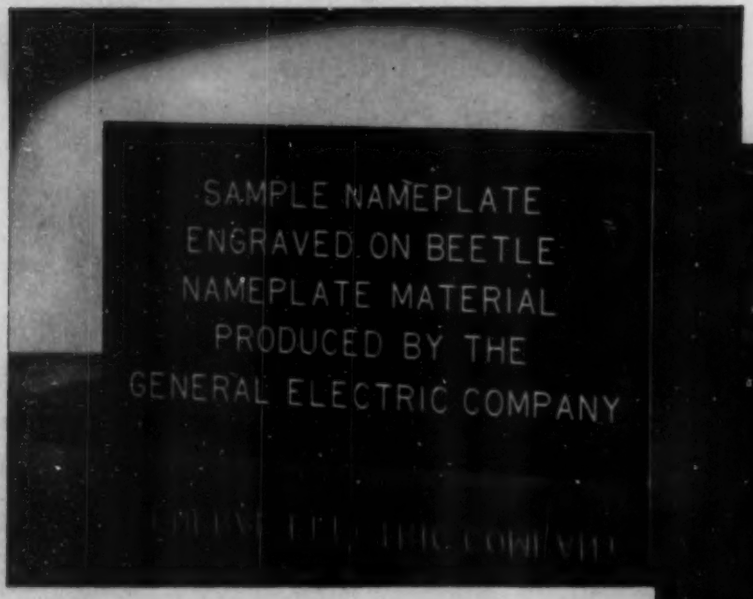
Beetle

BEETLE OPAQUE LAMINATED TELLS ITS OWN STORY

Beetle* in opaque laminated form is a highly attractive and convenient material for name plates, signs, dials, instrument facings and plaques on which letters, decorations and figures may be cut. It consists of a laminated Beetle panel between two thin layers of phenol



surfaces. Note how clearly and brilliantly the letters stand out against the smooth surface on the sample above. Strong but light in weight. Easy to keep clean. Available in a wide range of colors, Beetle opaque laminated is finding many new and interesting uses.

**Trade Mark of the American Cyanamid Company applied to urea products manufactured by it.*

NOTE THE LIGHT TRANSMISSION OF BEETLE TRANSLUCENT LAMINATED

The features of non-shatterable Beetle translucent laminated that have made it ideal for built-in panel lighting in ceilings, walls, pillars and columns, are its decorative beauty, brilliant and even colors, uniform light transmission. It is available in both rigid or flexible sheets for use in many new applications. Strong and durable, Beetle translucent laminated is an unusually interesting new material.

BEETLE PRODUCTS DIVISION OF AMERICAN CYANAMID COMPANY
30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

it's all color and in all colors

MODERN PLASTICS
AUGUST 1937 VOLUME 14 NUMBER 12

PAPER AND RESIN

by E. F. LOUGEE

Two important ingredients in laminated phenolics for industrial and insulating uses

LAMINATED PLASTICS, AS YOU PROBABLY know, consist of a varying number of sheets of paper, fabric, or other material which have been impregnated with synthetic resins, dried, and pressed together at elevated temperatures to form a tough, hard, homogeneous sheet. Such sheets may vary in thickness from .002 in. up to solid blocks whose thickness may be measured in feet rather than inches.

Depending upon their intended use, they are made either in "natural" color, that is without pigment, when they are of a shade of amber brown; or when intended for decorative purposes, they are impregnated with colored resins and possess a natural lustrous surface which is permanent beyond any finish which could be applied to the finished product.

Laminated materials are therefore divided, both in nature and in use, into two classifications: Industrial and Decorative. And while both are fundamentally similar in construction, they serve entirely different fields in their final application. This article will discuss the making of Industrial Laminated material, leaving the Decorative group for another time, although many of the processes and operations of manufacture are identical.

One of the most important properties of laminated materials to industries using them is strength, which they possess to a marked degree in comparative thicknesses and weights with other materials. Three measures of strength in which they excel are tensile, impact and dielectric. In order to obtain this strength, every ingredient entering into their manufacture must be carefully controlled.

For the greatest volume of the material produced, a rag paper is used as the base. In the early days of making laminated materials almost any kind of good wrapping paper was used but it was soon discovered that the longer and tougher fibers of rag stock improved the quality of

Testing for precision, tensile and flexural strength as well as hardness of laminated material in the laboratory of Taylor Fibre Company

PHOTOS BY RITTASE

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the finished product to such an extent that their use at the present time has greatly increased.

Rag papers give not only added strength to the product but they are highly resistant to deterioration through aging. It is a well known fact that rag papers are used for important documents which are to be preserved over long periods of time. Library copies of the *New York Times* and some other newspapers are printed on a special grade of rag stock that they may endure. Paper money is all made of rag stock. Rag papers in general are characterized by strength, permanence and resisting elements which give them longer life.

Rag papers have long fibers which make it possible to produce laminated materials that have certain properties which cannot be obtained with wood pulp fibers. Cotton is essentially a long fibered vegetable product and the method of preparation preserves the length of these fibers, where so often in preparation, wood pulp fibers are distorted and shrink.

When it is considered that the finished laminated product contributes its service to industry as insulating parts in radio and electrical equipment, the importance of the selection and manufacture of both paper and resin becomes clearly evident. The selection and manufacture of canvas and other fabrics which, combined with resin, are laminated for use as timing gears in automobiles, as pinion gears to drive paper making machinery and other devices, is equally important.

Taylor Fibre Company whose plant is illustrated on these pages, has recently built and equipped a complete paper making plant in which they prepare all the rag paper they use in the manufacture of their laminated products and for their vulcanized fiber. It is probably the first rag paper mill that has been built in the last twenty years and is, therefore, a revelation in modern manufacturing efficiency.

From Egypt, India, France, Holland, England and South America, as well as from domestic sources, come the well-washed, sun baked, aged cotton rags that make the finest paper for laminated plastics. Thousands of bales are stored in the new warehouse where a railroad siding feeds new shipments directly into the rag room at the Taylor plant.

These rags contain dust and other foreign matter, so the first step of reducing them to their original fibers is to run them through a dusting machine (Fig. 2) where they get a pretty rough shaking by a rapidly rotating cylinder while a suction fan removes the dust and some of the heavier solid objects which fall out in the process.

This dusting machine delivers the rags to a continuous conveyor sorting table (Fig. 3) where sharp-eyed girls pick out waste material, such as rubber, leather and paper—snip off buckles, buttons and such. At the end of this conveyor, the rags are fed into the shredder (Fig. 4) which cuts them up as fast as the conveyor can deliver them.

They emerge from the shredder on a conveyor (Fig. 5) which takes them to the floor above where they are put into a giant spherical boiler (Fig. 6). On the way, a magnetized roll in the conveyor once more searches the rags for any ferrous metals and drops them out when found. Good insulation in the final laminated product demands that no conductor of heat or electricity be present; it is therefore important that all metallic substances be removed from the ingredients which enter their construction.

In this huge sphere which is fourteen feet in diameter, the rags are cleaned, cooked and partially "digested" ready for the washers and beaters. The boiler is made spherical in shape so that as it revolves on its axis, the rags continue to fall in toward the center of the vessel, assuring uniform processing of the batch.

After this, the washers and beaters return the rags back into the fibers from which they were spun. Large quantities of clear artesian well water are constantly introduced as the rags, now reduced to fibrous condition,

are moved in a rapid circular motion around the tub. Dirty water is continuously removed. After thorough washing, chlorine is added to bleach the rags to snowy whiteness before they enter their final process.

The beater (Fig. 7) and a Jordan engine, carry on the further refining of the fibers which from here on are carried in liquid condition with large quantities of pure water. If color is desired in the laminated product, dyes are added in the beater which will provide fibers of the color in which the paper is to be produced.

PHOTOS BY RITTASE

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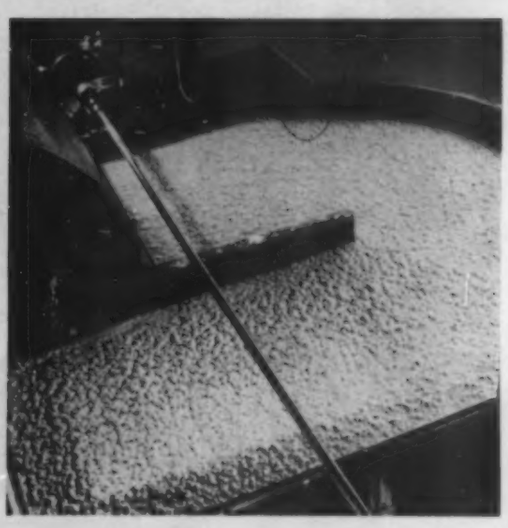

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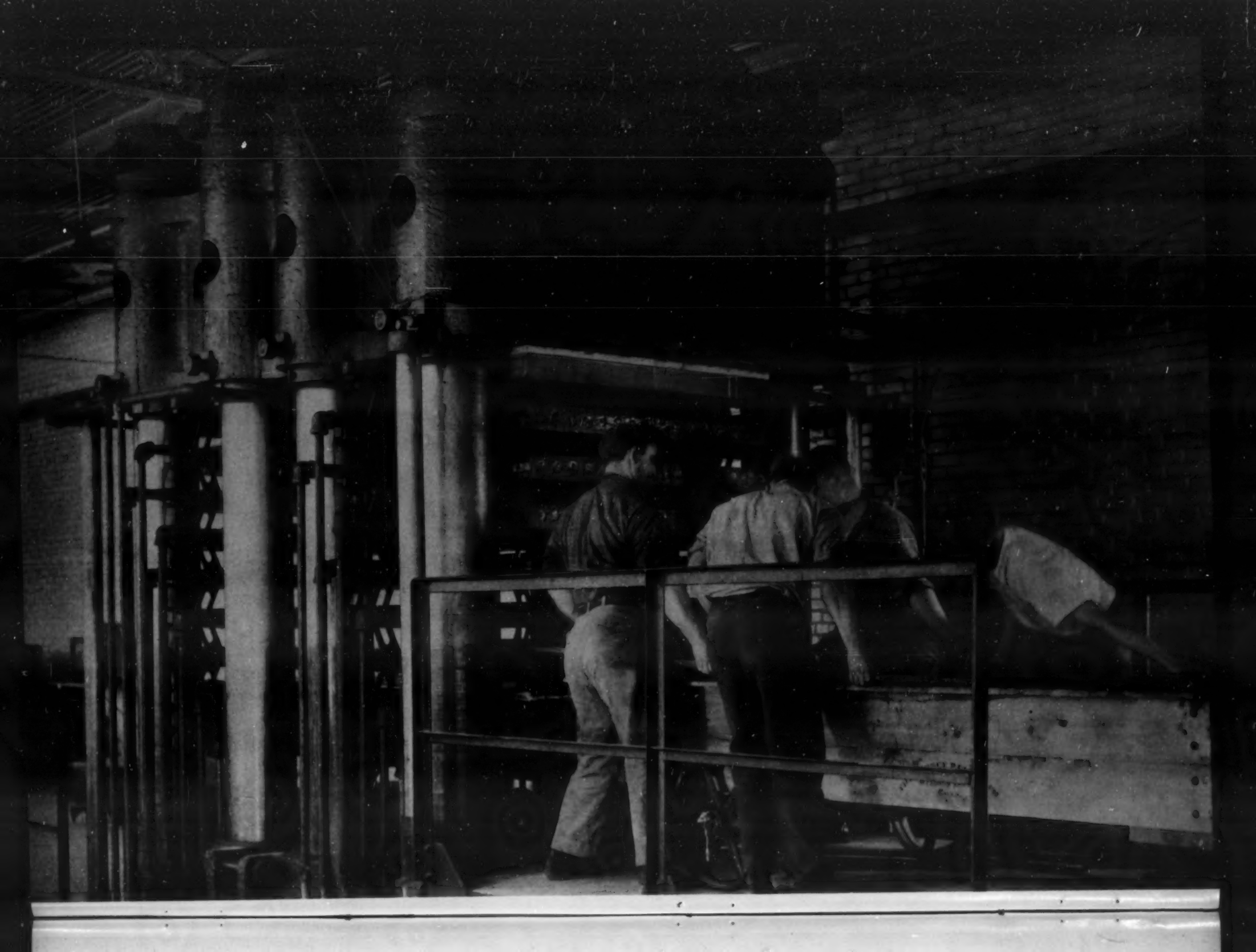

From the beater, this fibrous stock enters huge high-speed centrifugal extractors (Fig. 8) which whirls out any metal or other foreign material that has possibly escaped the many other steps of careful processing. This step is a final safeguard for positive assurance of perfectly clean stock which flows from the centrifuges through a screen with minute openings measured in thousandths of an inch, into the head box which distributes it evenly on the wire of the Fourdrinier machine (Fig. 9) where it begins its 500 ft. trip through the press rolls which squeeze out the water, mat the fibers together, then over steam heated rolls to be rolled up as finished paper at the other end of this continuous process.

That is but the beginning of laminated phenolic materials. Important as it is, paper is but one ingredient. Alone it hardly can be expected to make radio tube sockets, breaker strips, or any of the thousands of industrial items for which it is eventually to be used.

Paper must be impregnated with resin syrups which are plastics in one of their initial stages of polymerization. These resins are made by reacting chemicals in huge steam-jacketed kettles. Then they are stored in liquid form in huge tanks (Fig. 11). By gravity feed, they enter a tank through which the rag paper passes before winding its way over and under drying rolls in a specially constructed machine, to be sheeted or re-rolled at the other end.

The handling and processing of laminated stock from this point varies with the nature of the laminated product in which it will be used. Gear blanks, for example, are laminated in dies which shape them to the exact size and form required and bearings are frequently molded in place at the same time. Dozens of molding dies are inserted in multi-plate press (Fig. 12) where they "cure" within a comparatively short time. The "curing" or laminating process is accomplished with tremendous heat and pressure which fuses the material into a homogeneous mass.

Laminated sheets of any thickness are governed by the number of sheets of laminating stock placed in the press and their size is limited only by the limiting sizes of the press. One of the largest phenolic laminating presses in use today is shown on page 20, being loaded with sheets 50 by 110 inches in the Taylor plant. These sheets obtain their finish from metal plates placed on top and beneath each sheet in the press. A polished plate will deliver a lustrous surface while a sand-blast plate will reproduce a sand-blast or satin finish.

Huge blocks of the material are made in a similar press, then sawn apart with band saws to the required sizes and shapes. Large gears and similar parts are fabricated from blocks like this. Fig. 13 shows a sheet of phenol fabric gear material, $8\frac{1}{2}$ in. thick, being sawn to customer's specifications.

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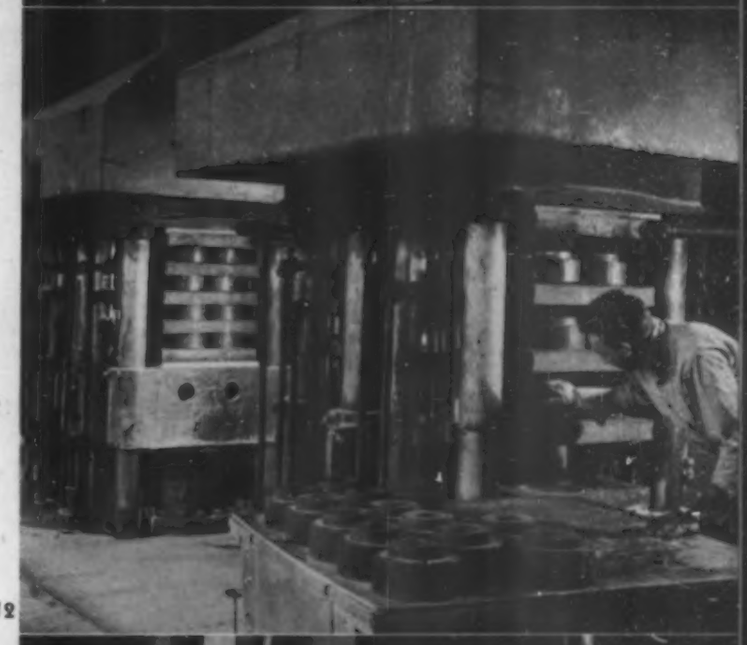

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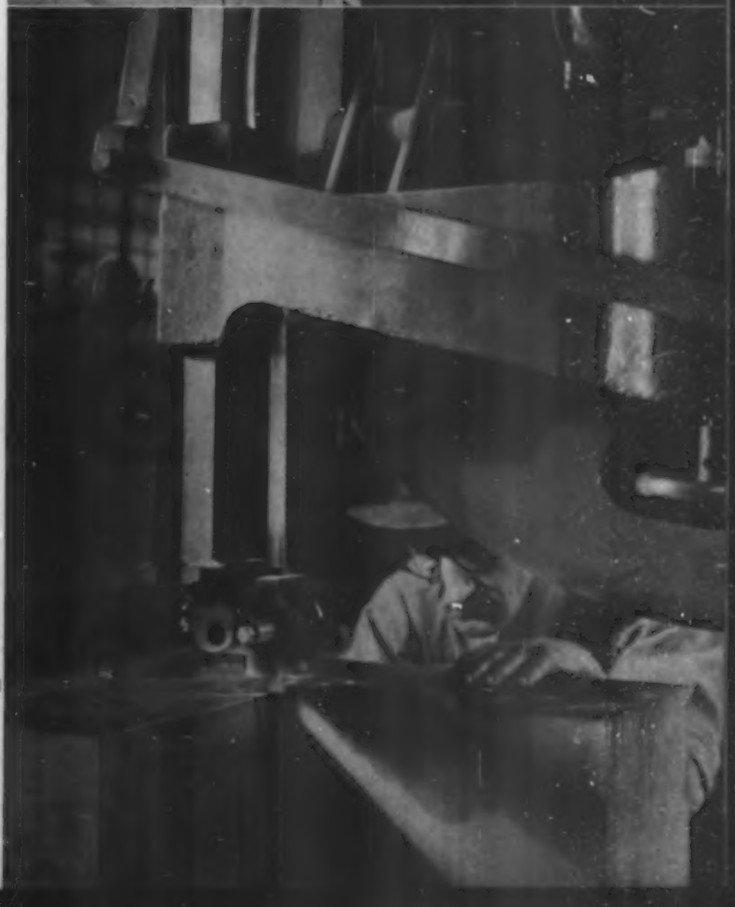


13

Illustration on opposite page shows sheets 50 by 110 in. being loaded into a huge multi-plate laminating press at Taylor Fibre Company plant

Square and round tubes are made by rolling the impregnated paper on mandrils, then curing by heat and pressure in much the same way as blocks are laminated.

Frost breaker strips of phenolic laminated are used in the majority of refrigerators today. You have probably noticed the band of black material about three inches wide which surrounds the opening of the refrigerator inside and seals it tightly when the door is closed. De-

PHOTOS BY RITTASE

14

15

mand for material to be used in this application has increased rapidly in the past few years and semi-automatic machinery has been developed to facilitate its economical production on a large scale.

Breaker strips are first produced in sheets of the proper thickness from laminating paper which was dyed black in the beater or to which black was added in the resin syrup at the time of impregnation. This gives breaker strip material a fine permanent glossy black finish which goes all the way through and can never chip, rust or dent. These sheets are then run through a machine with multiple saws adjusted to cut them to the desired width.

The next step is to punch the screw holes (when they are required) and for this a punch press (Fig. 14) is used which places holes so accurately that almost no variance in the finished laminated strips exists.

Sawing, of course, leaves an unpolished edge where the material has been disturbed by the teeth of the saw. It is necessary, therefore, to polish these edges and this is accomplished by feeding them rapidly through a channel on either side of which is a small grinding device which bevels or rounds their edges as desired, and passes them between two polishing or buffing wheels which restores their finish (Fig. 15).

Phenolic laminated is a synthetic, resinous material originally developed to meet the demands of engineers for a water-proof insulation, possessing great mechanical strength. (Figs. 16–17). This material retains its insulating properties even when exposed to moisture or high humidity. Because of its resistance to water, it will not warp or become distorted when subjected to alternating wet and dry conditions.

In view of this property, and the fact that it possesses the physical strength to withstand rough usage, it may be used as the sole support of current carrying parts. It also possesses the advantage of being very light in weight (about half the weight of aluminum), a property that is of great importance in the design of modern manufacturing equipment.

Its adaptability to all machining operations makes it readily fabricated with standard plant equipment. For radio fabrication, many special automatic machines have been devised by the concerns who specialize in this type of work. Radio tube bases are made by riveting two thin sheets of the material together with inserts automatically inserted from a hopper in the machine. Extremely rapid production is thus accomplished with resulting lowered cost of such finished parts.

Several grades are available, according to the material characteristics desired and sheets are supplied in the following sizes: approximately 50 in. by 110 in.; 50 in. by 50 in.; and 24 in. by 50 in. at the Taylor plant. A standard laminated sheet approximately 50 in. by 50 in. will weigh about $7\frac{1}{2}$ lbs. for each $\frac{1}{16}$ in. in thickness of the material.

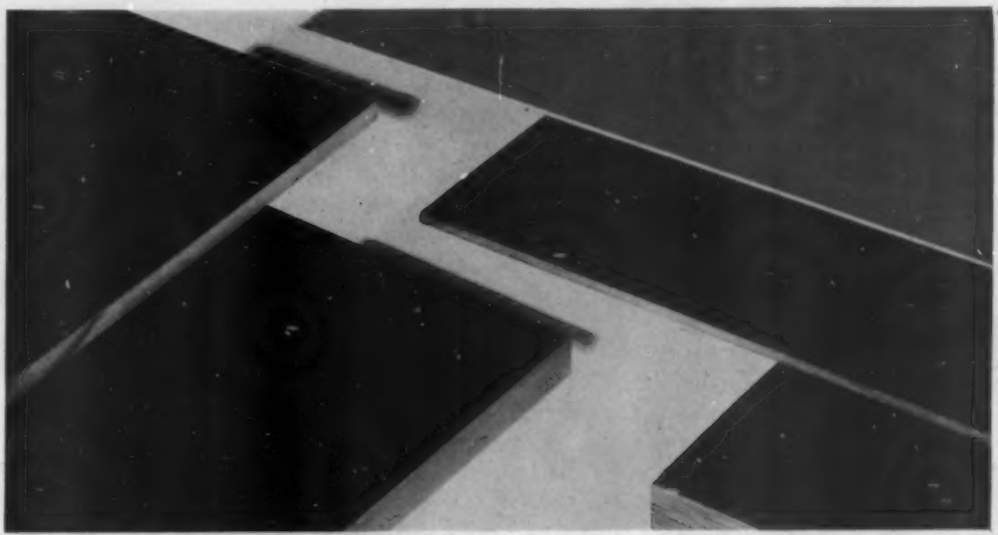
Silent laminated gears were the development of a long search by engineers for a material that would eliminate the noise, vibration and wear of clashing, chattering metal-to-metal gear contacts in many different kinds of machinery—while retaining all of the other desirable features of this positive, powerful, efficient, accurate method of machine drive. Laminated fabric gears used between metal gears in the gear train, eliminate metal-to-metal contacts, absorb the shocks of tooth impact, lessen wear not only to the gears themselves, but throughout the entire machine as vibration is minimized.

This remarkable material is not only strong enough for the heaviest duty drive, but is so light in weight (one-sixth the weight of steel), it materially reduces dead load on the drive. These gears are impervious to water, oil and most chemicals—are not subject to rodent

attack—are unaffected by oxidation and resist the effects of abrasive dust—water will suffice for lubrication.

Phenolic gear blanks may be machined in any manner in which it is possible to machine metal—only much more rapidly. They may be cut into gears of all types—helical, spur, bevel or worm. Where fabric gears are required in volume by a manufacturer as a standard equipment item of large demand (such as automotive timing gears, etc.), the gear blanks are molded to the specifications of the manufacturer. For the smaller quantities of the wide variety of sizes and types of fabric gears used throughout industry, gear blanks are sawn from sheets of this material, made in various thicknesses and grades to suit individual requirements. *(Continued on page 66)*

PHOTOS BY DE LARDI



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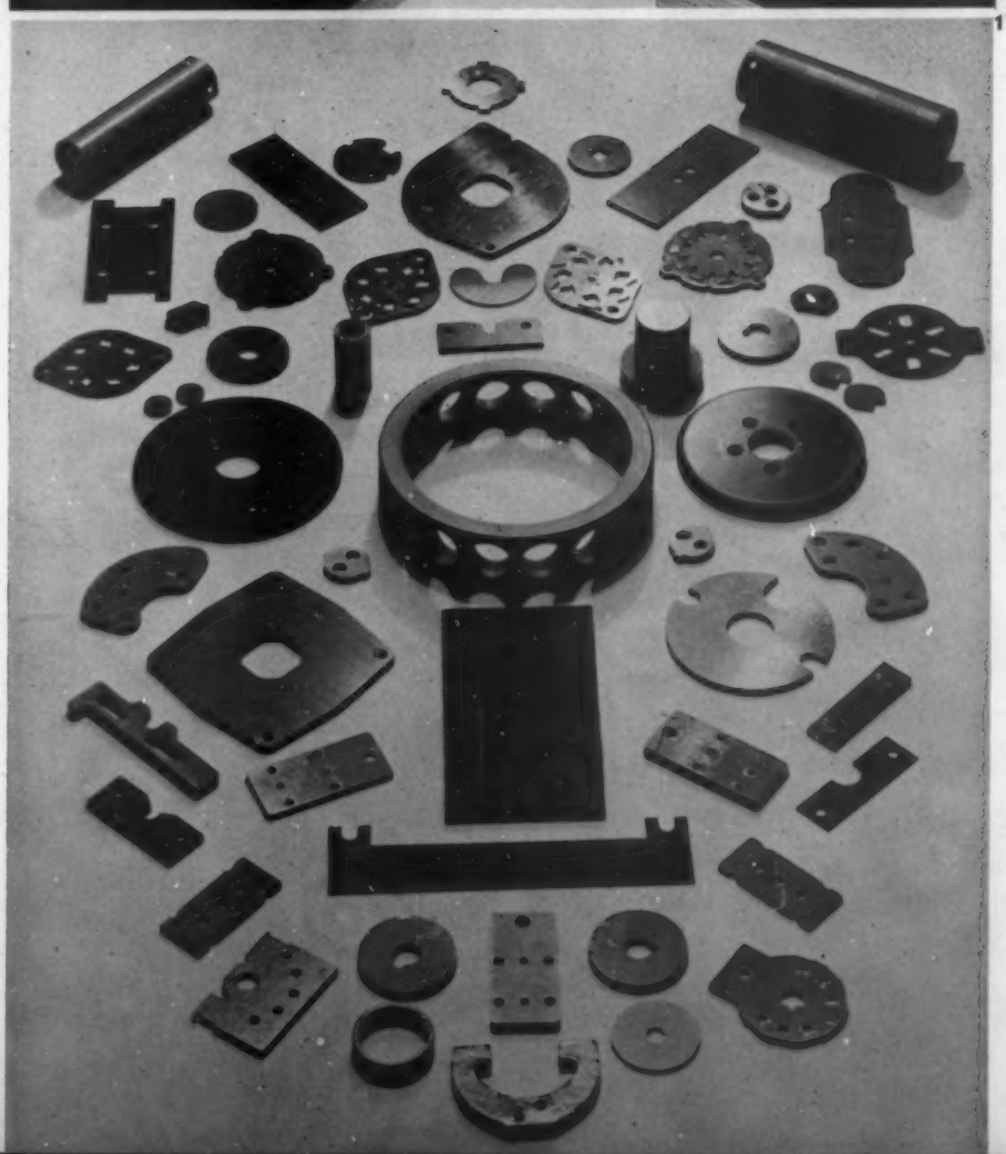


17

TO POPULARIZE TOMATO DRINK

by FRANKLIN E. BRILL
General Plastics, Inc.

Selling by suggestion is neatly done with this molded dispenser in the form and coloring of a big ripe tomato

BARNHAM DISPENSER COMPANY ANNOUNCES a new tomato juice dispenser for use at soda fountains and refreshment stands, which dispenses ice-cold tomato juice when a button is pressed. It is an excellent replica of a ripe tomato and is molded of red and green plastics to heighten the illusion.

Poorly merchandised and rarely displayed in bulk at fountains, tomato juice has set a remarkable record for rapid popularity in the last eight years, but Watson F. Barnhart and William C. Hammond, principals of the Barnham Dispenser Company, felt that much greater popularity for tomato juice could be developed by making it as accessible and easy to purchase as any fountain drink. Indication that the new dispenser accomplishes this is seen in the experience of a dealer with whom one of the tomato dispensers was left for trial. He was skeptical, protesting that a gallon would last for a month, but called up for another gallon within two hours after installation.

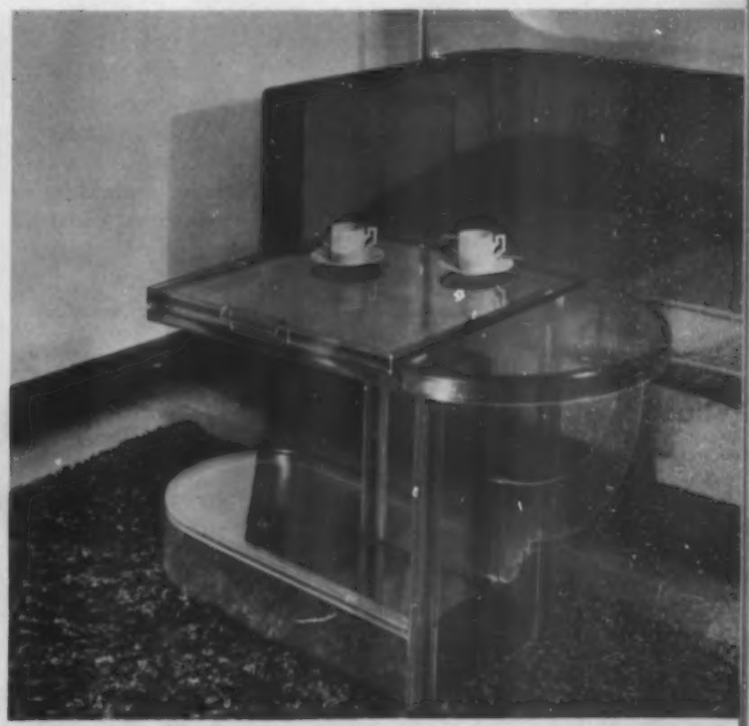
As a molding job, the Barnham dispenser is unique. It stands 16 in. high and is 38 in. in diameter. The tomato portion is molded of a special scarlet moisture-resistant Durez to prevent moisture absorption from the condensate forming on humid days. It is molded in two halves, the top half being easily removable for refilling of the juice container. Inside the bottom half are a metal container for crushed ice and a porcelain-lined container for the juice itself.

The bottom of the dispenser is molded of bright green phenolic material, and is equipped with rubber feet, a cut-out portion to permit placing the glass beneath the faucet, and a drain cock to permit condensate formed inside to be drained out occasionally. The faucet mechanism is done in bright chromium with white handles. Other decorative touches are the green rubber leaves at the top, and the handle of the agitator, which protrudes to simulate a stem and which also is molded of green phenolic plastic.

Early models of the Barnham dispenser were made of metal but it was found unsatisfactory due to polishing and enameling difficulties, and the danger of chipping, scratching and denting in use. The durability of of molded plastics and the ease with which the permanent colors could be obtained were the main reasons for the adoption of molded parts. Chicago Molded Products Corp. did the molding.

INGENUITY AND CELLULOSE ACETATE HAVE BEEN CLEVERLY COMBINED BY CORA Scovil, New York decorator, to provide spectacular furnishings for modern interiors. Result: A transparent piano, except for the ends which are of wood, by Hardman Peck & Co., with an all plastic bench strong enough to hold the pianist: A transparent coffee table with removable tray: The chair at the lower left, which may cause some misgivings to those sitting in it for the first time, is sufficiently rugged to hold a two hundred pound occupant: And the transparent cosmetic cart at the lower right (created for Elizabeth Arden) which may be trundled from boudoir to bath to boudoir as convenience demands. Designed by Miss Scovil, these interesting novelties were made from Plastacele (sheet cellulose acetate) in her studios, called Vazah Inc.

DU PONT



YOUR COMPETITION

(EDITORIAL COMMENT)

THE SECOND ANNUAL MODERN PLASTICS COMpetition belongs to you—lock, stock and barrel! It is designed and presented exclusively for the benefit of the readers of this magazine. No one else, except possibly those few outside our readership who may happen to visit the exhibition, can benefit by it. The opportunity is YOURS, and your rewards will be measured solely by the effort and enthusiasm you put into the Competition in your behalf.

Entries are coming in much more rapidly than they did last year. Splendid examples of ingenuity and design have already appeared. This is gratifying to us because it indicates that the Competition is recognized as a national event in the plastics field. It indicates, too, that interest in the Competition is not confined to those engaged in the manufacture and handling of plastic materials, but is recognized generally by those manufacturers in all industry who have found plastics to be a sound and fundamental material for manufacturing purposes. This interest will revert to your advantage.

IF YOU ARE A MANUFACTURER OF ANY SORT OF plastic material there is no better way in which you can bring your materials to the attention of industry than to gather together as many things as you possibly can which have been made from your materials and enter them in the Competition where they will be labeled with your company's name and exhibited to the public when the Competition has been judged.

IF YOU ARE A MOLDER, FABRICATOR OR LAMInator of plastics materials no better opportunity is offered to display the engineering skill and manufacturing ingenuity of your organization than to exhibit your products in competition with others from every branch of the industry where they can be seen by hundreds of executives who will visit our exhibit this fall. There is no possible way in which so much favorable publicity can result with so little effort on your part. If there is any doubt of this fact, just ask some of the exhibitors who made entries last year. They have been first to respond in the present Competition.

IF YOU ARE A DESIGNER WHOSE ASSIGNMENTS during the past year have afforded you an opportunity to work with plastic materials you will surely recognize the advantage which is yours if your completed designs are entered and prominently displayed in this year's exhibit. No field holds greater promise to the designer who recognizes in these materials a medium for expression that other materials so frequently fail to provide. Plastics are versatile, with a color range that needs only a wisdom of choice to execute outstanding industrial design in many applications that have not yet been attempted. It is through such Competitions and Exhibits as this that new contacts are made.

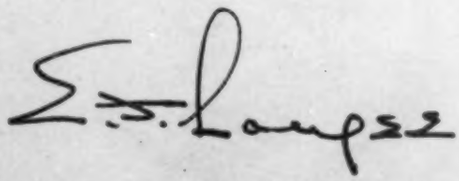
IF YOU ARE A MANUFACTURER OF ANY MERchandise in which plastics have contributed in any way you can render a definite service to the industry by cooperating with your custom molder, or with the material suppliers whose products you use, in submitting through them as many entries as you possibly can. The greater the number of entries, the greater interest our visitors will find in reviewing them. We have given freely of our knowledge and our time, both through editorial information distributed to you as a subscriber each month and through the thousands of letters we answer each year in response to your requests. You can repay us in kind by cooperating in this event which we believe is of definite value to our readers and the industry itself.

IF YOU ARE A SALESMAN ASSOCIATED IN ANY way with the plastics industry, you can take no better steps to acquaint your prospects with the success of your product than to urge your customers to cooperate in this endeavor. Each plant you visit offers many potential entries to the Competition, and a simple suggestion will often secure the molded or laminated part to be entered through your home office.

Only about another month remains in which entries can be made. The Competition closes on September 15th. Entry blanks to be included in this year's event, must bear a postmark no later than that date.

ON THE OPPOSITE PAGE, WE ANNOUNCE THE judges who have volunteered their services to attempt to choose the most practical and pleasing applications of plastics in each of the groups in which entries will be divided. Their experience and standing in their various fields need no further commendation from us.

The one point we would like most to emphasize is, that IF you are making entries in the second annual MODERN PLASTICS Competition, send them to us as quickly as you can. If additional entry blanks are required, please let us know.



HARVEY WILEY CORBETT

GRACE ALEXANDRA YOUNG

LURELLE GUILD

MARIAN YOUNG

PRUNELLA WOOD

FRANCES HUGHES

MORRIS B. SANDERS

JOHN HAVEKOST

J. EARL SIMONDS

JUDGES OF MODERN PLASTICS SECOND ANNUAL COMPETITION

DECORATIVE GROUP

Harvey Wiley Corbett
Architect

Grace Alexandra Young
Editor Creative Design

Lurelle Guild
Industrial Designer

STYLE GROUP

Marian Young
Women's Page Editor NEA

Prunella Wood
Fashion Editor Kine Features Syndicate Inc.

Frances Hughes
Tobe

INDUSTRIAL AND SCIENTIFIC

Morris B. Sanders
Architect-designer

John Havekost
Havekost Engineering Co.

J. Earl Simonds
Plastics Consultant

All entries for the Competition should be postmarked not later than September 15, the closing date. Judging will take place shortly thereafter and winners will be announced in our November issue.

INTIMATE INCIDENTALS

by EVE MAIN

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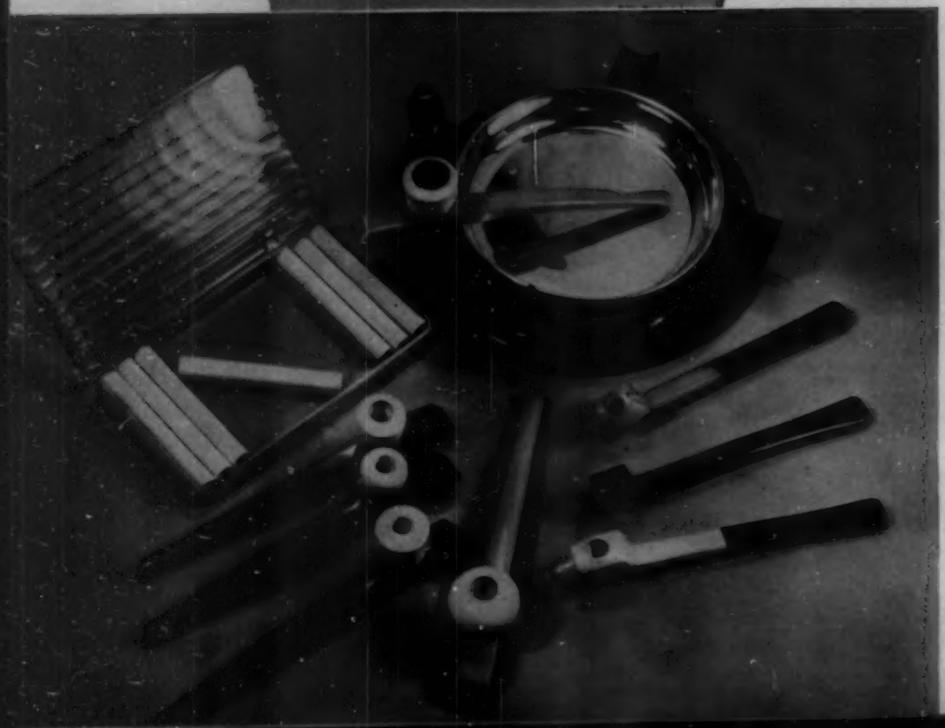

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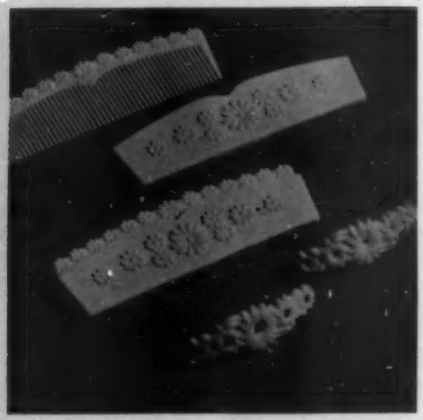

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Each day brings forth new lures to attract indefatigable shoppers who make the rounds no matter how torrid the weather. And hard-to-please, indeed, is the woman who doesn't end her trip with at least a few of these inexpensive, colorful accessories. (1) Catering to the whimsies of women smokers, the Wilke Pipe Shop obliges with dainty cocktail pipes in pastels or more brilliant transparent, translucent and opaque cast resins. They are designed for use with cigarets, or pipe tobacco if the smoker has advanced to that stage. Shown with the pipes is a transparent cigaret case and a deep red ash tray, both of cast resin. (Photograph courtesy Catalin) (2) Little things certainly count when it comes to keeping unruly locks looking shipshape through summer winds and weather, and there seems to be no lack of inspiration for effective hair-controllers. This white bandeau, for instance, with its delicate floral motif, is rigid enough to keep its shape indefinitely, yet so light in weight that it is scarcely noticeable once adjusted. (3) Matching vanity comb with case (shown both opened and closed) and barrets, with or without colored stones in the center of each blossom, form a workable set. Bandeaux, vanity combs, and barrets may be had in any color for practically any occasion, for these same designs are finished in gold, silver or gunmetal, as well as pearlized pastels such as rose, green, blue, orchid and yellow. (Injection molded of cellulose acetate by Kingman Company for Ben Hur) (4) The persistent shopper will also find a wealth of other designs, shapes and colors in barrets, and bobby pins; some long and narrow with feather or floral decorations; some round framing a ship, elephant or little dog. Buckles and buttons for wash dresses adopt floral motifs to harmonize with some of the hair ornaments. (5) An exquisite white butterfly barret perched cockily over the ear manages to look ethereal while admirably doing its job of holding hair in place. (6) Flexible links between blossoms characterize a pale green bandeau, and a yellow bandeau sprouts tiny flowers and leaves. (Injection molded of cellulose acetate by Tilton Cook) (7) And for the eyes, "blinders" with smoky green lenses front and side so that not a vestige of sun glare can seep through. Pliable and nonbreakable, these are dinked out of sheets of cellulose acetate. (From McCreery's)

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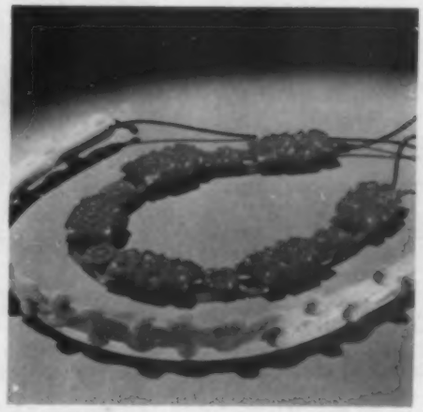

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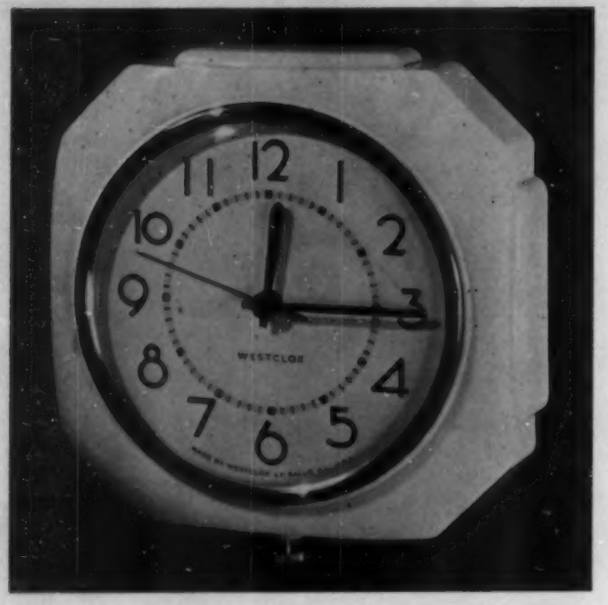
PLASKON



WALL CLOCK FOR WESTCLOX:

"The feeling is general among managers of clock departments that plastic cases sell clocks faster, season in, season out."

"A wide variety of colors for clocks induces people to buy more than one clock and establishes a place for clocks in the decoration schemes of key rooms."

No surprise to alert merchandisers who make and sell Plaskon clocks will be these opinions expressed by New York department store executives. Sleek Molded Color clocks sell faster because they are good looking, permanently colorful, and easy to clean, and offered in several Plaskon colors.

This attractive new Westclox clock for kitchen or bath is a profitable model. Its Molded Color case helped make it so by carrying on the Westclox reputation for quality, service and satisfaction.

Molded by Chicago Molded Products, Inc.

FAMILY GROUP FOR GRUEN:

About a year ago, the Gruen Watch Company of Time Hill, Cincinnati, chose a blue molded package with gold striping and embossing for its famed watches. It was an immediate sales success. Two other boxes were added to fill out the line, and below you see the Gruen family group of packages which are distinguishing themselves in jewelry merchandising. Rathbun Mfg. Co. is the molder.

Since manufacturers first discovered and jewelers first acclaimed light-fast Plaskon jewelry boxes, nearly every manufacturer in America has standardized on these durable and beautiful cases. With plastics, intricacies of design possible with no other material for mass production, have been incorporated. In every case the results have justified the switch from traditional materials to Plaskon.

If you have a product that deserves the best in packaging, the sales gains of products newly packaged in Plaskon will interest you.

AUGUST 1937

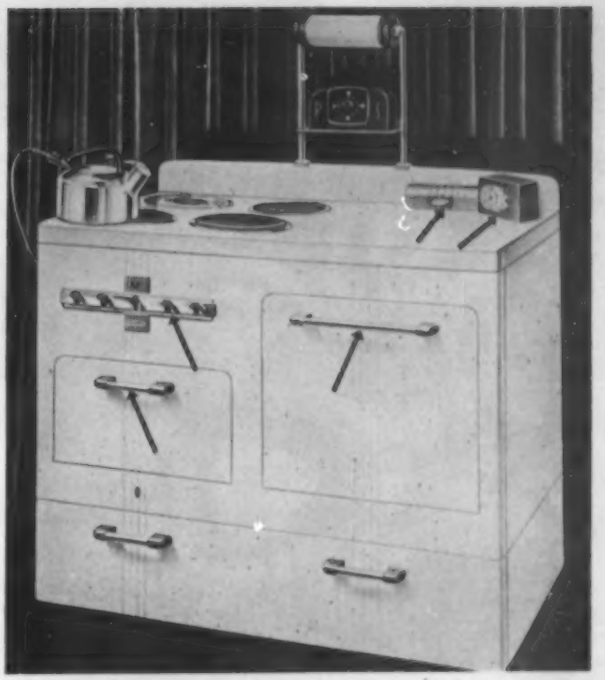
RANGES THAT SELL:

Wilbur Henry Adams, designer of the 1937 Electromaster ranges, says:

"I selected Plaskon for use on the 1937 Electromaster Ranges because of its resistance to grease and acids, its inability to conduct heat and its complete durability in withstanding the hard usage that the average kitchen range receives.

"Its wide range of color allows the designer to get the rich color tones so necessary in dressing up the appearance of kitchen appliances of all kinds.

"I think all designers today feel a deep gratitude to Plaskon for placing such a pliable product at their disposal for use in achieving new and more beautiful designs. Its future in the designs of household equipment cannot be anything but highly succesful."



• A 1937 Electromaster Range with Plaskon handles and switch buttons. The mark timer and electric clock are also molded color.

What has been done with Plaskon by capable designers and engineers in the field of household appliances and elsewhere, has been translated into sales success by wide awake sales managers and merchandising staffs. For detailed information on colorful, light weight, permanent finish Plaskon, write the world's largest producers of urea molding materials. Plaskon Company, Inc., 2121 Sylvan Avenue, Toledo, Ohio.

• Colorful Plaskon on the Grand stove adds greatly to its trim appearance. Because the soft, smooth finish of Molded Color is kind to their hands, housewives favor Plaskon stove accessories.

• The Cleveland Cooperative Stove Company, makers of the Grand Stove, also manufacture the Sherman range. Sherman parts below are blue Plaskon moldings. American Insulator is the molder.

PLASKON COMPANY
INCORPORATED

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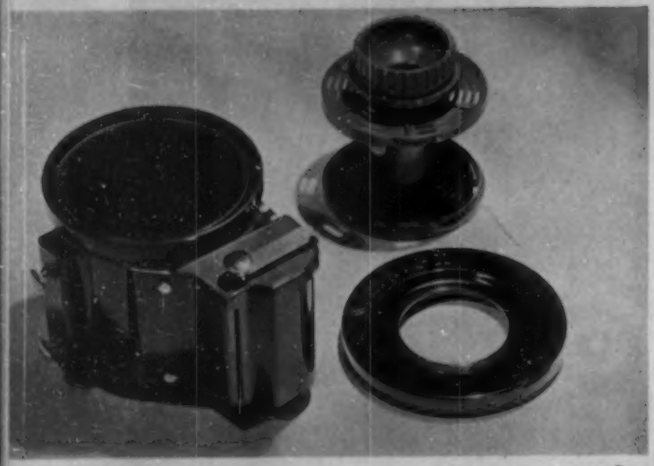

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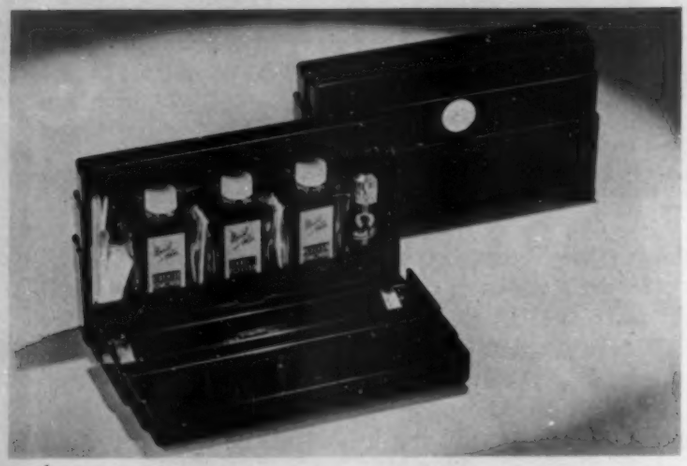

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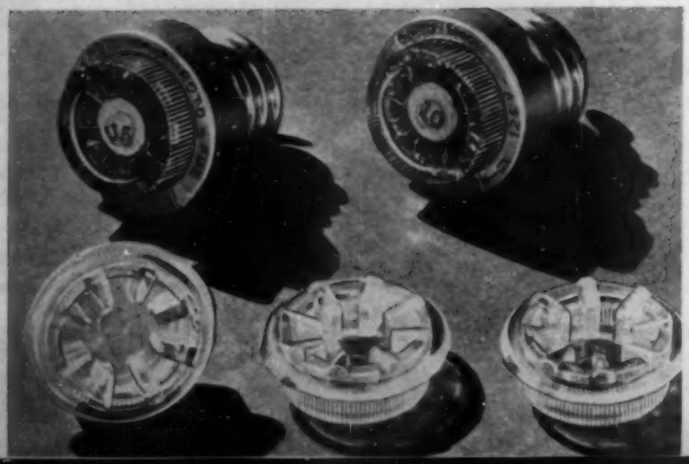

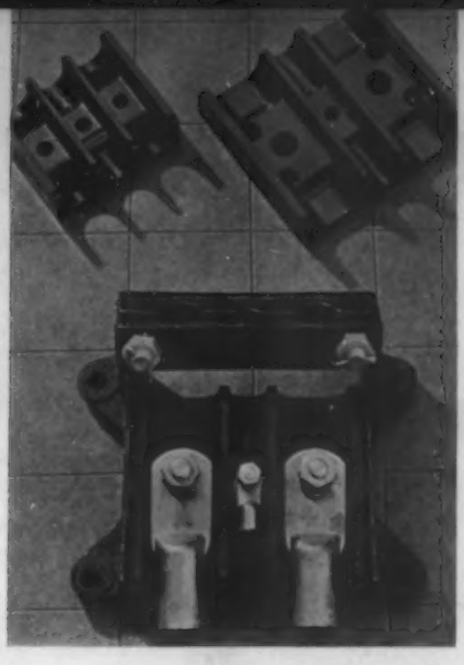

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1. A viscose sponge is mounted into toggle-hinged Durez shells, and used to remove moisture from photographic film by sandwiching the filmband between the sponges. Developed by Stricker-Brunhuber Corp.

2. Diminutive hands of carved Catalin in many colors are clipped on the lapels of a summer suit. The hands have black or red fingernails and wear painted bracelets

3. Simplex Automatic daylight loading developing tank for films $2^1/_4$ in. by $3^1/_4$ in. is made light-proof through the use of molded plastics which also are unaffected by the chemicals of photography. Molded in Austria, distributed here by Mimosa American Corporation

4. This Muriel Astor manicure set is molded in Australia by Nally Ltd. of Nestorite, a phenolic material. Designed by Colin Jolly and N. F. Leggatt, and illustrated through the courtesy of A. S. Harrison & Co. Pty. Ltd.

5. Bakelite molded reinforced with a piece of semi-cured Phenalite gives this fuse puller and line tester the necessary strength. Manufactured for the Star Fuse Company by National Vulcanized Fibre Company

6. A burnt fuse in this Roto-Fuz plug is quickly relieved by a single turn of the transparent Lucite head, in which a separate fuse is attached in each notch. Injection molded by Erie Resistor Corp.

7. The molded Orel-Simplex Turntable runs 3–8 weeks by a flashlight battery, but has perfect balance and will take a tray 36 in. diameter and 5 lbs. weight. It lends itself readily to display all standard shop fittings. Made in England

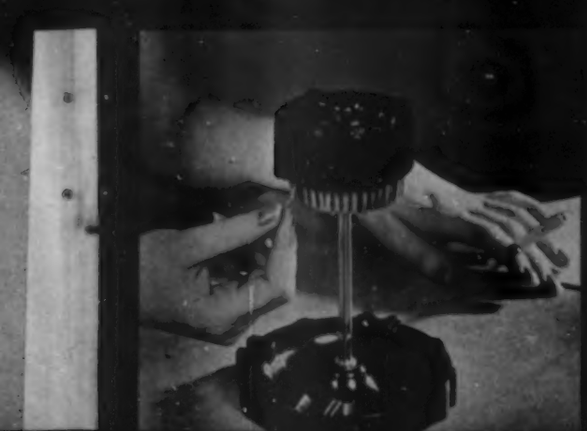
8. Matches automatically light when they are pulled from the Prince Model dispenser designed by Carl Sundberg for the American Pullmatch Co. Retainer top and ash tray base are molded by Kurz-Kasch Inc., of Bakelite and Beetle in light and dark colors

9. Seth Thomas range timer performs triple duty in the kitchen—automatic oven control, electric kitchen clock and reminder signal for timing. Molded by Auburn Button Wks. Inc. of Bakelite and designed by P. G. Darrot

10. Instruments used in the analysis and comparison of liquids by color are being molded of Textolite by the General Electric Co. for Hellige, Inc. Durability and economy in handling and shipping are among the advantages

11. Special Durez is used for insulating these terminal blocks with extra-heavy sections to withstand impact and extreme compression from tightening terminals. Molded for Safety Car Heating & Lighting Co. by Norton Laboratories, Inc.

12. With mechanical improvements and the new "Ultra-Quiet" Micarta blades, Westinghouse Elec. & Mfg. Co.'s new fans cut current consumption, and generate a greater volume of breeze. Micarta is a laminated phenolic



COLOR FOR THE MODERN BATH

is quite simply achieved through the choice of well planned accessories

WITH THE COLOR CONSCIOUSNESS WHICH DECoration has brought to American homes even purely functional things have come in for their share of attention. The bathroom of a decade ago for example was dull indeed. But not so today. On the contrary, it is frequently one of the most colorful and cheerful rooms in the home, especially the modern home. The tin tub has long since disappeared as has the enclosed plumbing which went with it, and which was considered modern in its day. In their place we find the more sanitary porcelain fixtures resting on a tile floor, or at least on a floor which is neatly and completely covered with rubber, linoleum or other decorative and cleanly surface. Walls, too, have been tiled, or at least treated to a surface which is easy to clean and to keep clean over a long period of time.

In almost every instance, a well thought out color scheme has been chosen to lend attractive grace to this much used room. Colored papers are no longer pasted upon the window panes, instead they are usually clear glass and smart new curtains have replaced the made-over-ones-from-the-kitchen which used to suffice. Bath mat, towels, and shower curtain bear a matching or contrasting relationship to the general color scheme of a well planned ensemble.

Convenience seats have been made more sanitary and permanent by a cellulose covering which retains its color and can be washed indefinitely without damage. Other seats are molded completely of plastic materials. It is comparatively recently however that plastics in the form of molded color have added their contribution of charm and practicality to the modern bath. They first made their appearance as faucet handles which were less breakable than porcelain, therefore less dangerous in use. It was impossible for them to splinter or shatter from impact, and being insulative, they were never too hot or too cold to handle with comfort.

It remained for the Republic Brass Company, however, to produce a complete over-tub fixture of molded urea material and metal designed in good taste. Plaskon, in the most approved pastel shades, is combined with chrome in a pleasing ensemble. The circular wall plate, and the graceful grips are molded in matching color and give the fixture a permanent finish unattainable in other materials. Tiny squares of the molded material cover the heads of the attaching screws and are marked with the letters "H" and "C" for easy identification. The attaching bezel, water spout and handles themselves are brass which has been chromium plated.

Grips may be graceful and slender without danger of breaking when plastics are combined with metal this way. Color, of course, goes all the way through and will not fade

The Republic Brass Company, with its years of experience in the manufacture of fine bathroom fittings, has chosen plastics as the most practical as well as the most acceptable way of introducing color into its product to meet the demands of builders and decorators for less drab and less ordinary functional equipment. And these fixtures are so designed that they may be installed promptly and economically by homeowners whose plans for reconstruction and redecoration call for more color in the modern bath in keeping with today's tempo.

Stock molds

SHEET THIRTY-NINE

Compact traveling items and make-up kits which can be conveniently carried in the purse can be obtained from stock molds. Interested executives should use company letterhead specifying both sheet and item numbers when writing for samples

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497. Make-up kit molded in five separate sections holds lipstick, rouge and powder. Each part is threaded to screw tightly closed and the case is compact to carry in a handbag. Top has debossed design and is 1/8 in. high. Lipstick holder is 5/16 in. deep inside. Rouge and powder sections 11/16 in. deep inside, while base is 1/8 in. The case is about 2 3/8 in. overall

498. Removable cover protects this eye cup from dirt and scratches and makes it a handy traveling accessory. 1 5/8 in. in diameter and 1/2 in. high. Made in black or light colors

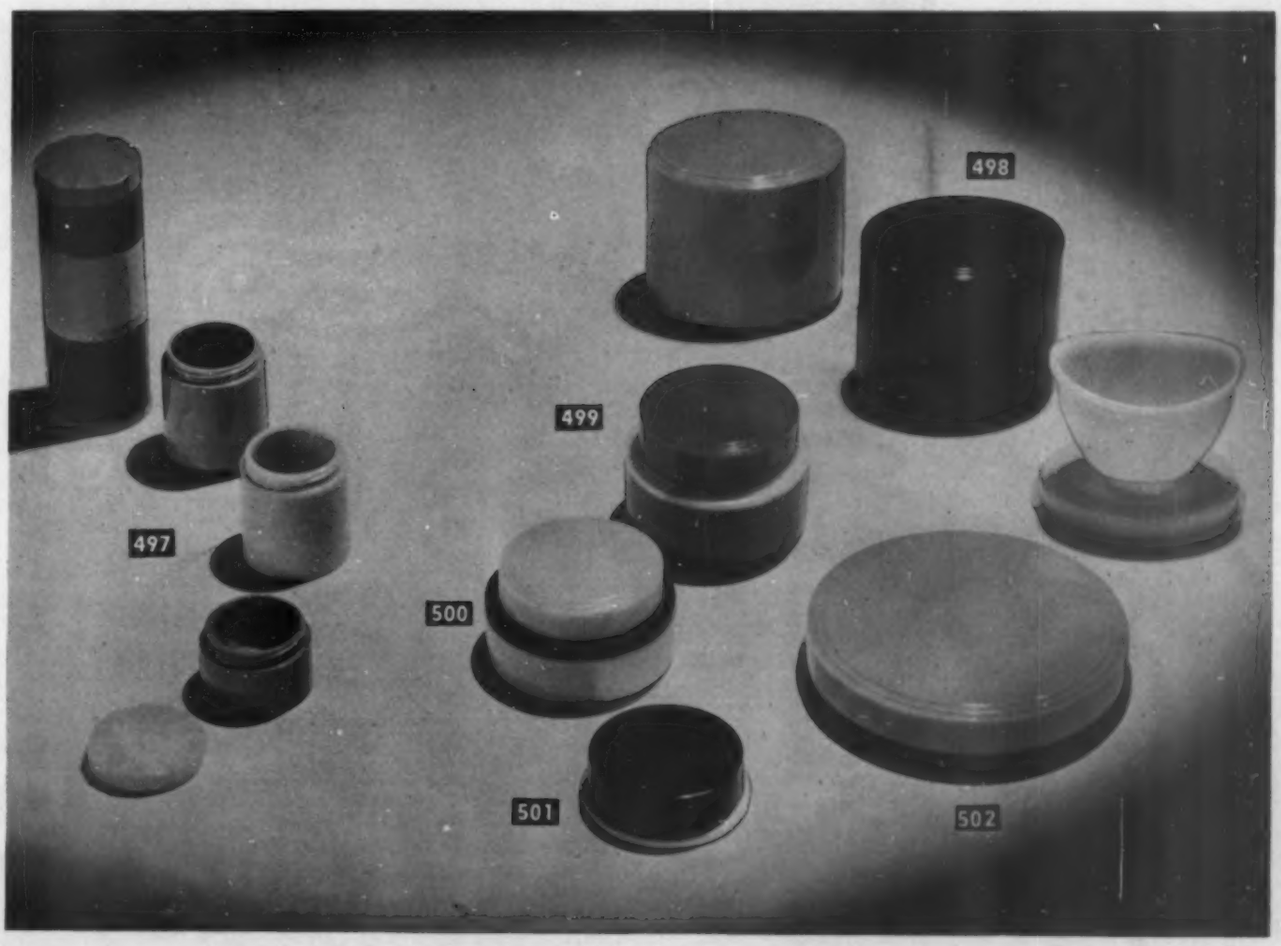
499. Cream jar 1 in. diameter with screw cover 1/4 in. high. 1 1/2 in. overall height. Holds 1/4 ounces. Coltrock lined

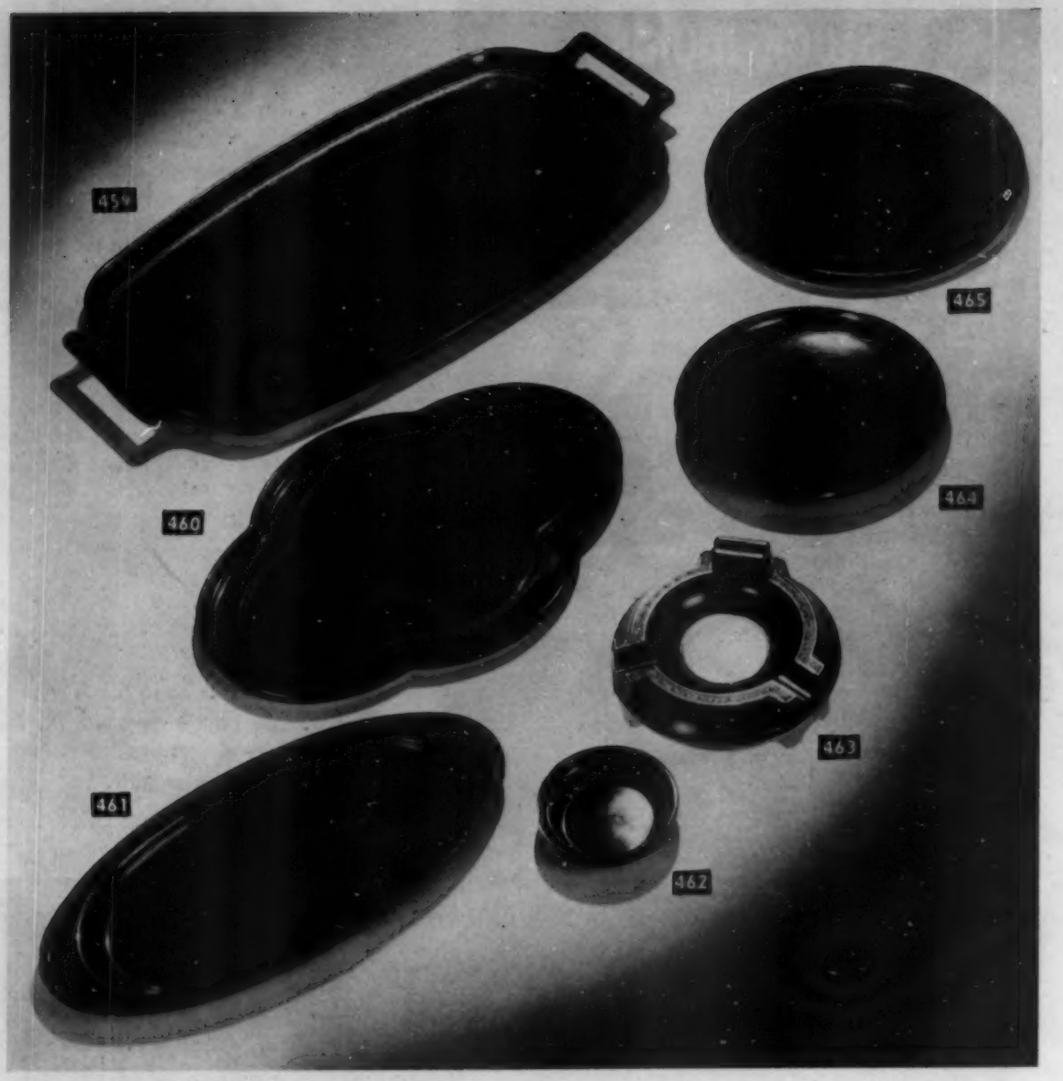
500. Cream jar 1 1/2 in. diameter with screw cover 3/16 in high. 7/8 in. overall. Holds 1/8 ounce. Coltrock lined

501. Paste rouge or mascara container 1/4 in. deep inside and 5/16 in. diameter. 3/8 in. overall height. Screw closure

502. Rouge jar 2 3/16 in. diameter and 1/4 in. deep inside. 1/2 in. overall; screw closure. Phenolic base and urea top

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.





Stock molds

SHEET FORTY

Plastic trays do not chip easily and are not affected by alcohol, liquids or even cigaret burns. They are obtainable from stock molds in a wide variety of colors, and comparatively small quantities can be purchased with economy. Interested executives should write on company letterhead when requesting samples.

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.

459. Serving tray 10 in. by 18 in. with molded handles which afford an easy and secure grip

460. Oval tray 12 1/4 in. by 8 3/4 inches

461. Long tray convenient to use as a bread tray or for serving beverages, 5 3/4 in. by 11 5/8 in. Decorated edge

462. Nested ash tray 3 1/4 in. in diameter

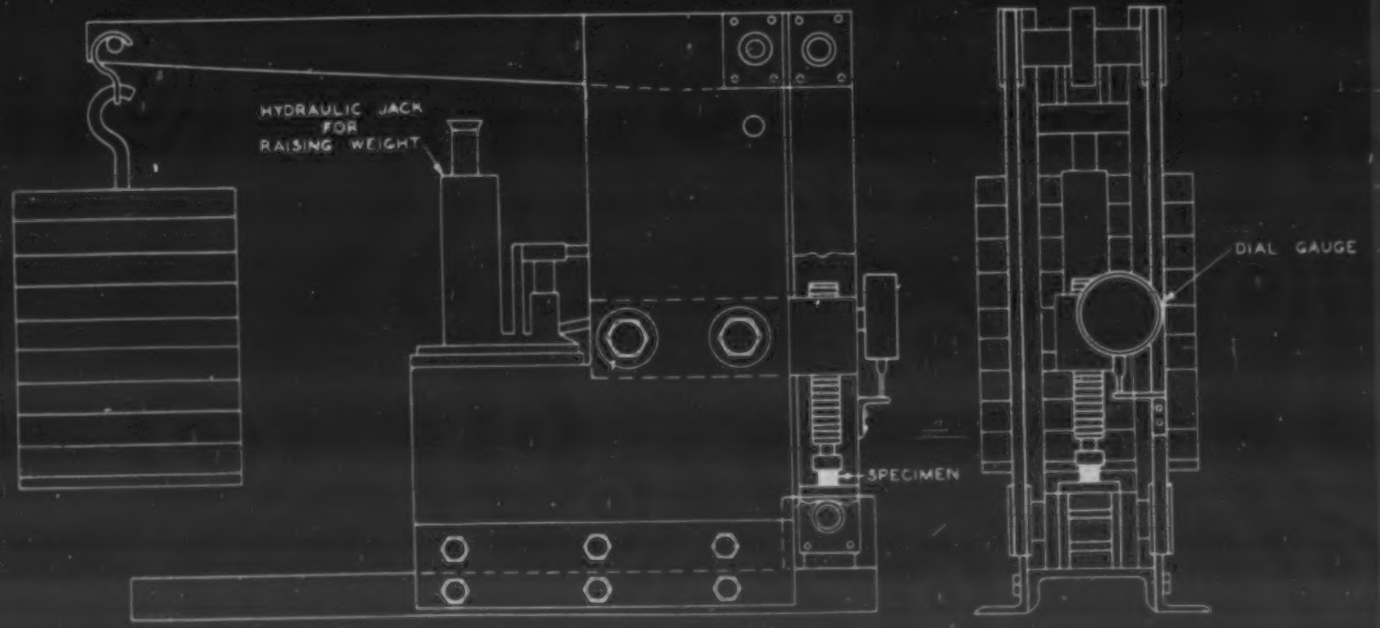
463. Ash receiver 5 1/2 in. in diameter with two cigaret rests and a match box holder

464. Change tray or coaster 7 in. in diameter

465. Round tray 9 in. in diameter with decorative edge and inside debossed design

MODERN PLASTICS

TECHNICAL SECTION



COLD FLOW TESTING MACHINE
DEVELOPED BY THE
BELL TELEPHONE LABRATORIES INC

Control

For automatic circuit breakers, where the forces of electrical power are brought under perfect control, the choice of leading manufacturers is Durite. Circuit breakers such as those illustrated here are literally the "safety valves" of industrial electric circuits. Their duty is to be ever on guard against temporary overloads that might damage costly equipment, cause delays or even temporary plant shut-downs.

That Durite is selected for such highly important equipment is ample evidence of its worth, but this is only one of thousands of applications where Durite has been the specified choice of leading companies for many years. If you have never had occasion to learn of their advantages, write and ask about these unusual Plastics by Durite, the exclusive producers of phenol-furfural resins.

A FEW REASONS WHY DURITE PLASTICS WERE CHOSEN FOR THESE CIRCUIT BREAKERS

1 *Properties inherent in Durite make the embodiment of revolutionary features of design practical for large scale economical production.*

2 *The high dielectric strength of Durite gives ample insulation wherever required between current carrying parts. Designs can be compact without endangering safety of operation.*

3 *Durite is light and strong. Weight can be kept down, for properly designed Durite parts are surprisingly resistant to shock, stresses, and chemical attack.*

4 *Production and assembly costs are reduced to a minimum. Covers, frames, and handles come from the molds with mounting lug inserts in position, and flutes and surface finish formed in one operation. All drilling and tapping operations are eliminated and only a slight buffing or grinding is required to remove fins.*

5 *The glossy black finish on the Durite is permanent. Continual handling will not cause the finish to dull, crack or peel off for it is an integral part of the molded article. This attractive and durable finish, moreover, is unaffected by moisture, oils and most common solvents, and is highly resistant to corrosive fumes, and weak acids and alkalies.*

DURITE
Plastics

Frankford Station P. O., Philadelphia, Pa.
A DIVISION OF STOKES & SMITH COMPANY

PLASTICS AT THE ASTM MEETING

by GORDON M. KLINE

THREE EVENTS OF INTEREST TO THE PLASTIC industry featured the annual meeting of the American Society for Testing Materials which was held during the week of June 28th at the Waldorf-Astoria in New York. In the order of their occurrence on the program these were the Symposium on Consistency, the Marburg Lecture on "Plastics: Some Applications of the Different Classes-Methods of Testing," and the organization meeting of Committee D-20 on Plastics.

The Technical Committee on Consistency, Plasticity, and Related Properties, of the Society's Committee E-1 on Methods of Testing, has before it as a primary consideration the establishment of authoritative nomenclature and fundamental principles underlying the measurement of these properties of materials. In the program arranged by this committee, the advances made in the measurement of the consistency of such materials as paints, asphalts, coal tar products, petroleum lubricants, and rubber were considered, including a discussion of the theoretical background and the existing nomenclature. A résumé of the various methods used in the case of the thermosetting resins for determination of arbitrary flow values, for expressing the summation of the flow value, change of flow value, and change of hardening speed with time, was presented in a paper entitled "Measurements of Flow Characteristics of Thermosetting Resins" by Messers. H. L. Bender, H. F. Wakefield, and H. E. Riley. The permanently thermoplastic resins fall within the same group of flow problems as the asphalts and the cellulose derivatives. However, the behavior of the thermosetting resins is more complicated. For these materials the rate of flow is changing during the period of flow measurement and numerical flow values are the resultant of very complex phenomena. Cold flow, that property of many organic insulators by which the material exhibits permanent deformation under the influence of those pressures and temperatures frequently encountered in service, was discussed by Messrs. Robert Burns and Irving L. Hopkins in a paper entited "Cold Flow of Insulating Materials." (See page 42.) The increasing importance of this problem in electrical switching apparatus for the telephone industry was pointed out and cold flow data for various plastics were presented.

The Marburg Lecture on plastics by Dr. T. Smith Taylor was heard by the major portion of the 1,500 members who registered at this Annual Meeting. Doctor Taylor received his A.B. degree from Yale in 1906 and his Ph.D. in 1909. He taught for several years at the University of Illinois and Yale University, and then served as Research Physicist at the Westinghouse Electric and Manufacturing Company from 1917 to 1924. He became Chief Research Physicist of the Bakelite Corporation in 1924. In 1933 he established a consulting practice and the following year was appointed Professor of Physics at Washington and Jefferson College. He has recently become associated with the Diehl Manufacturing Company. In his lecture Doctor Taylor discussed the properties and applications of the various commercial plastics and then considered in some detail the problem of the measurement of the tensile strength of plastics. This latter discussion was based largely on the experiences of Committee D-9 on Electrical Insulating Materials, of which Dr. Taylor is Chairman, in the development of a standard method for the determination of tensile strength of molded insulation.

Committee D-20 on Plastics met on July 1 and adopted by-laws governing activities of this group. The scope of the committee was defined as the development of test methods applicable to finished products in the field of plastics. The term "finished products" includes molding materials, sheets, tubes, rods, and molded or fabricated articles. Plastics entering into the paint and varnish industry or the rubber industry are not included, nor are methods for measuring electrical properties. The following officers were elected: Chairman, W. E. Emley, National Bureau of Standards; First Vice-Chairman, B. Andersen, Celluloid Corporation; Second Vice-Chairman, T. S. Taylor, Diehl Manufacturing; Secretary, W. A. Evans, Bell Telephone Laboratories. Five subcommittees to develop test methods and chairmen for same were appointed as follows: Strength Properties, H. M. Richardson, General Electric Company; Hardness Properties, J. C. Pitzer, Formica Insulation Company; Thermal Properties, L. M. Currie, National Carbon Company; Optical Properties, H. W. Paine, E. I. du Pont de Nemours and Company; Permanence Properties, G. M. Kline, National Bureau of Standards. The committee voted to sponsor a symposium on plastics at the Regional Meeting of the American Society for Testing Materials to be held in Rochester, N. Y., during March, 1938. The chairman of each subcommittee is to undertake to procure for this symposium a paper dealing with some phase of the work of his group.

The initial membership of Committee D-20 comprises 35 companies and individuals. These are listed hereafter, together with the names of the representatives appointed by the various organizations:

American Insulator Corporation: B. H. Bowlus; Bakelite Corporation: C. A. Nash, W. A. Zinzow; Bell Telephone Laboratories: R. Burns, W. J. Clarke, W. A. Evans; Carbide and Carbon Chemicals Corporation: H. L. Cox, H. F. Robertson; Celluloid Corporation: B. Andersen; Commercial Solvents Corporation: C. Lichtenberg; Diehl Manu- *(Continued on page 66)*

FILMS AND SHEETING FROM PLASTIC PRODUCTS

by HAROLD A. LEVEY
Consulting Chemist

ALMOST ALL OF OUR SEEMINGLY NEW PRODucts of today have a lengthy historic background. Some of these histories and the developments they include are most interesting narratives, like many of these materials, films and sheeting made from a wide variety of natural and synthetic products enjoy such a record.

In order that a composition may be suited to the manufacture of films and sheeting, it must when made into this form, be sufficiently flexible to satisfactorily withstand the stresses to which these materials are usually put. While the thicker sheeting may be made from such inorganic materials as glass and mica, films, which we may designate as being thinner than a hundredth of an inch, invariably are composed of organic products. Many of the newer plastics, particularly of the thermosetting types are not suited for this use and its varied applications. They are inherently brittle and do not respond to the action of plasticizing agents.

Plastics in the form of films or sheets have much greater value and wider applications if they are both completely transparent and water-white. Probably the first types of plastic materials which served such purposes as the above were products of nature like the water soluble gums including gum arabic and agar-agar among the vegetable materials, and gelatin, glue, and egg or blood albumin from animal sources. With the development of improved chemical processing other products from both sources became applicable for these uses.

With the advent of synthetic products came the cellulose derivatives. This type of composition seems to be supreme among the plastic products for this particular application, viz., films and sheeting. Nearly a hundred years ago cellulose nitrate was first prepared. Among its early applications in film form was a protective coating for wounds, called "collodion" and consisting of about a 4% solution of cellulose nitrates in a mixture of ether and alcohol. Later many better and more useful solvents were found as well as the solid solvent or plasticizer, camphor, which formed pyroxylin, the first synthetic thermoplastic. This composition became available in colorless transparent sheets and promptly found extensive application in the arts and industries. Its commercial production into films 6 to 10 thousandths of an inch thick made the motion picture possible. The fire hazard of this type has strongly militated against its use in thin films such as are employed for wrappings.

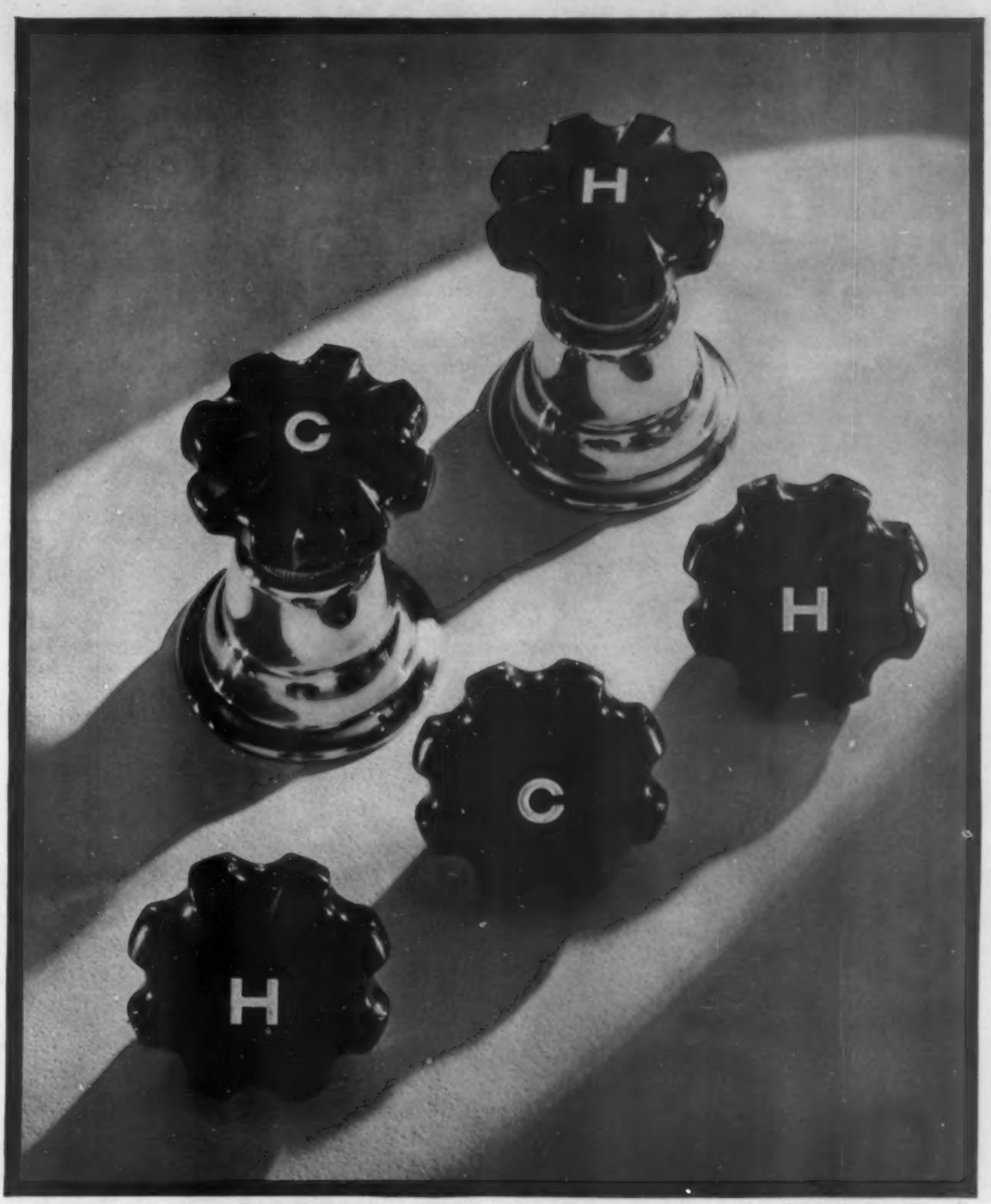
Another cellulose ester, cellulose acetate, has consistently been making deep inroads into the uses and application of cellulose nitrate. The acetate derivative possesses most of the properties of the nitrate and is less flammable. With rapidly declining production costs, a wider gamut of relatively low priced solvents, and plasticizers giving it thermoplastic properties, it now occupies a premier position as a material for the manufacture of films and sheeting from a thousandth of an inch thick or less to slabs of an inch or more thick.

As very thin sheeting approximating a thousandth of an inch it finds use as a general wrapping and packaging material particularly for food products and is now competitive with Cellophane. In addition, because of its inherent waterproof properties it finds many applications for which Cellophane is not satisfactory. Its high dielectric value, low moisture absorption and high specific inductivity make it valuable as an insulator in the electrical industry. It has already found extensive use as the dielectric in telephone and radio condensers as well as an insulating lamination in telephone relay coils. Because of its moistureproof characteristics thin cellulose acetate sheeting is gradually replacing the cheaper though less satisfactory gelatin sheets now used as color lighting screens in the theatrical and motion picture industry as well as in window and decorative displays and color lighting systems.

The newest application for thin transparent sheeting is as an outer surface lamination or covering over printed or multi-color lithograph work on both paper and fibreboard stock. This type of product is a runner-up of the cellulose lacquered (nitrate or acetate) coating over similar printed surfaces which has recently come into vogue, and has educated the public to an appreciation of, and a willingness to pay for this type of surface.

With a marked independence of atmospheric humidity changes, very thin cellulose acetate sheeting soon found use as the window covering for envelopes. The dimensional changes of cellophane with differences of humidity resulted in abnormal distortion of the envelopes and thus prevented the use of this type of sheeting.

Undoubtedly the most widely known and used type of transparent sheeting is that of regenerated cellulose made by the viscose process and known by the trade names of Cellophane and Sylphrap. This product in its process of manufacture is a viscous plastic mass in an aqueous sodium hydroxide solution. In view of the very extensive washing and purification operations involved, it is not practical to fabricate this type of plastic into films of more than two thousandths inch thick. Thicker sheeting is, however, made by laminating many of the thinner films together by means of the proper type of adhesive and adequate pressure. This composition is no longer a plastic after the cellulose has been regenerated and is not soluble in the common organic solvents. It does not respond appreciably to (*Continued on page 71*)



Tenite handles molded by the American Insulator Corporation for the Republic Brass Company

TENITE

FAUCET HANDLES are replacing the old-type fixtures that often become cracked or discolored. Molded around a metal insert, Tenite handles are unbreakable. Made in one piece, they are sanitary and easy to clean, retaining their high luster without polishing. In Tenite's rich, permanent colors, they are a decorative addition to the modern kitchen or bath. Illustrated above are Tenite handles molded by the American Insulator Corp. for the Republic Brass Co., to be used on the Youngstown Pressed Steel Co. De Luxe Sinks. Send for the 52-page book on Tenite.

TENITE SALES REPRESENTATIVES: New York: 171 Madison Ave. Chicago: 2264 Builders Bldg. Detroit: 914 Stephenson Bldg. Pacific Coast: Wilson and George Meyer and Company, San Francisco, Federal Reserve Bldg.; Los Angeles, 2461 Hunter St.; Seattle, 710 Belmont Pl.

TENNESSEE EASTMAN CORPORATION, KINGSPORT, TENN. **Subsidiary of the Eastman Kodak Company**

COLD FLOW OF INSULATING MATERIALS[1]

by ROBERT BURNS[2] and IRVING L. HOPKINS[2]

IT HAS LONG BEEN RECOGNIZED THAT MOST OF the materials used for insulating purposes are subject to mechanical deformation under nominal pressures and at normal room temperatures. This characteristic becomes more pronounced, of course, as the pressure and temperature are increased, the most significant changes in dimensions occurring when the apparatus in which the materials are being used are exposed to abnormally high indoor or outdoor temperatures.

Since the very inception of the telephone art, this property of organic insulators, called "cold flow" has been of substantial importance since the precise operation of electromagnetic switching apparatus, both as to rapidity and sequence, is of the very essence of our business, particularly in regard to dial systems. In some cases it is necessary to make or break several electrical contacts in a definite reproducible sequence with a total movement of only 20 or 30 thousandths of an inch and for a period of 15 years or more.

With the coming of electrical control of our furnaces, refrigerators, air-conditioning apparatus and other comforts of modern civilization, and of the almost complete reliance of industry and transportation upon electrical switching systems—even the farmer is becoming more and more dependent on them—cold flow phenomena must assume increasing importance.

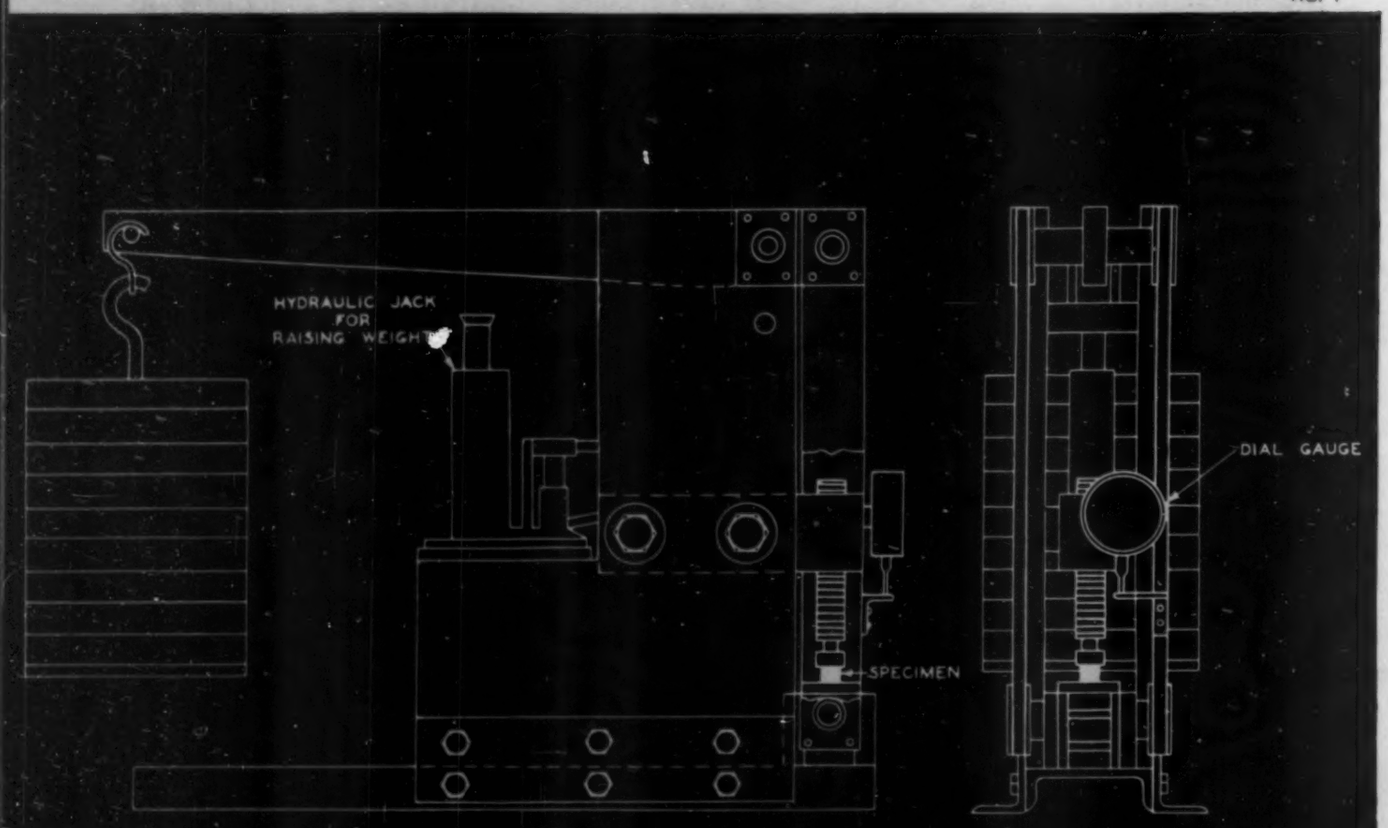
The evaluation of non-rigid materials in terms of consistency, plasticity and related physical properties is generally made by one of several methods such as the capillary tube, falling ball or parallel plate plastometer, the latter being especially applicable to the semi-solid materials such as greases, waxes and asphalts. From results obtained with parallel plates the behavior in flow of these substances can frequently be predicted with reasonable accuracy.

There are other insulating materials in wide use, however, which exhibit a complexity of properties which may be grouped under the term cold flow and are difficult to analyze under normal conditions by any of the fundamental methods. One of these is hard rubber, which embodies elasticity, viscosity, elastic recovery, and permanent set.

To illustrate—a plot of hard rubber on log-log scale when tested with parallel plates at 160 F. (71 C.) and at suitable loads, is at the beginning of the test a straight line with a curve at the (*Continued on page 69*)

[1] Presented as part of the Symposium on Consistency at the Annual Meeting of the American Society for Testing Materials in New York, June 29, 1937.
[2] Members of the Technical Staff, Bell Telephone Laboratories, Inc.

FIG. 1



COLD FLOW TESTING MACHINE
DEVELOPED BY THE
BELL TELEPHONE LABRATORIES INC

☛ there is
☛ still time

TO ENTER YOUR PRODUCT

in the SECOND MODERN PLASTICS COMPETITION

Entry open, without fee, to designers, fabricators, molders, manufacturers or machinery makers responsible in part or in whole for the creation of the item entered.

All entries must be submitted on or before September 15, 1937.

Send now for full details and entry blanks. Address—

MODERN PLASTICS

425 FOURTH AVENUE, NEW YORK

PLASTICS DIGEST

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them

General

STRESS OPTICALLY LESS SENSITIVE MATERIALS IN PHOTOELASTICITY. A. G. Solakian. Mechanical Engineering *59*, 423–4 (June 1937). For measurement of the sensitivity of stress by monochromatics, a material of high stress-optical sensitivity with high elastic constants is desirable, such as cast phenol-formaldehyde resin. For the determination of the direction of principal stresses through isoclinics, a material of low stress-optical sensitivity should be used for the model. Plexiglas and Lucite are recommended by the author for the latter purpose. The optical and elastic constants of this type of synthetic resin are given as follows: Relative optical sensitivity (glass = 1.00): 1.25 (for Pollopas, a German urea-formaldehyde resin, 6.40; for l'Orca, a French acrolein resin, 14.40); Fringe stress value (lb. per sq. in. per in.): 920 (Pollopas: 180; l'Orca: 80); Elastic limit (lb. per sq. in.): 4,000; Max. strength (lb. per sq. in.): 10,000; Mod. of elasticity (lb. per sq. in.): 400,000. Values for other plastics are given in MODERN PLASTICS of August 1936, page 63.

INDIAN LAC INDUSTRY. H. K. Sen. Science and Culture *2*, 454–9 (Mar. 1937). The cultivation of lac, its manufacture into shellac, and the entomological and chemical investigations of the Indian Lac Research Institute are described. Percentage consumption of shellac in various industries is given as follows: gramophone records 35–40; electrical insulation 15–20; paint and varnish 15; hat stiffening 10; sealing wax 5; lacquering, grinding wheels, etc., the rest.

PIGMENTS, LAKES AND OTHER COLORING MATERIALS IN PLASTICS. J. H. Clewell and H. W. Paine. Ind. and Eng. Chem. *29*, 750–4 (July 1937). See abstract in MODERN PLASTICS of May 1937, page 44.

Materials and manufacture

VISTANEX, A POLYMERIZED HYDROCARBON. Anonymous. Rubber Age *41*, 102 (May 1937). Vistanex is compatible with such materials as rubber, paraffin, waxes, asphalts and petrolatums. To most mixtures it imparts a decided plasticizing action, particularly at low temperatures. Pitches, petrolatums and paraffin may be blended to form "rubbery" compounds of good flexibility and elasticity. It is incompatible with chlorinated rubber, cellulose esters and ethers and most lacquer plasticizers.

IMPORTANCE OF PURIFICATION OF WATER IN THE PLASTICS INDUSTRY. J. Delorme. Rev. Gen. Mat. Plastiques *13*, 169–73 (May 1937). Methods of purifying water for the manufacture of cellulose and casein plastics.

PLASTICIZERS. W. D. Scott. Chem. Age (London) *36*, 564 (June 26, 1937). A review.

CELLULOSE ESTER LACQUER SOLVENTS AND PLASTICIZERS. Anonymous. Chem. Age (London) *36*, 568–9 (June 26, 1937). A review of modern products.

DEVELOPMENT OF SYNTHETIC RUBBER IN THE PAST TWENTY YEARS. I. Williams. Rubber Age *41*, 37–8 (Apr. 1937). A review of butadiene, Neoprene and Thiokol developments to meet conditions for which natural rubber is not suited. Production in the United States, which is rapidly increasing, is at present in excess of 150,000 lbs. per month. A number of plants are producing butadiene rubber in Germany and Russia.

Molds and molding

THE SELECTION OF STEELS FOR SERVICE. R. T. Rolfe. Iron and Steel Industry (London) *10*, 523–7 (July 1937). Carbon steel is generally used for smaller die blocks where the design is not intricate and where there are no sharp corners to break off. With greater size and intricacy alloy steel must be employed. Comparative strengths and ductility of a number of quenched and tempered carbon and alloy steels are cited:

Description	Carbon steel	3.5% Nickel steel	Nickel chrome steel	Nickel chrome molybdenum steel	Manganese molybdenum steel
Carbon %	0.275	0.35	0.30	0.35	0.35
Manganese %	0.95	0.5–0.8	0.53	0.59	1.40
Nickel %	—	3.25–3.75	3.08	3.68	—
Chromium %	—	—	0.89	0.79	—
Molybdenum %	—	—	—	0.08	0.35
Yield point, tons/sq. in.	30.32	45 (min.)	60.8	50–55	54.0
Ult. strength, " " "	61.69	55–65	64.7	60–65	63.2
Elongation, %	15.5	18 (min.)	19	18–22	21.0
Reduction of area, %	48.5	50 (min.)	59.3	50–56	51.0
Izod impact, ft. lb.	70	35 (min.)	38	40 (min.)	53

DEVELOPMENTS IN GRAPHITIC STEEL FOR TOOLS AND DIES. F. R. Bonte and M. Fleischmann. Metal Progress *31*, 409–13 (Apr. 1937). Experimental work devoted to the development of a material combining the free machining and resistance to wear of cast iron with the response to heat treatment and forgeability of steel, is described. Graphitic steel, which is a high carbon steel in which part of the carbon is present in the form of graphite, apparently possesses these qualifications to a marked degree.

ECONOMY IN PRODUCTION MOLDING. Herbert Chase. Am. Mach. *81*, 402–4 (May 19, 1937). The production of plastic parts, with and without metal inserts, by the Boonton Molding Company is described.

Applications

INDUSTRIAL EQUIPMENT PROTECTED BY SPECIALLY FORMULATED SYNTHETICS. Anon. Steel *100*, 56, 58 (May 24, 1937). Government analysis disclosed that maple sugar products contained objectionable quantities of metallic impurities. The Vermont department of agriculture suggested refinishing equipment with paints free from poisonous substances. Several brands of enamels and aluminum paints containing phenolic resins were applied and tested under actual operating conditions. These finishes were approved as being satisfactory from the standpoint of ease of application, adhesion, time of drying, hardness after contact with sap and resistance to abrasion and freezing. Other examples of steel food and beverage equipment and miscellaneous industrial equipment protected from corrosion by synthetic finishes are given.

PLASTICS IN AIRCRAFT CONSTRUCTION. Marcus Langley. British Plastics *9*, 5–8 (June 1937). After a brief discussion of present applications of plastics for windshields, electrical insulattion instrument boards and plywood cements, the author describes the main structures of an airplane and their functions as a prelude to considering the physical properties of existing plastic materials in relation to their possible uses in aircraft construction.

LAMINATED SYNTHETIC RESIN: RECENT INSULATION DEVELOPMENTS. A. E. Williams. Electrical Rev. (London) *120*, 767 (May 21, 1937). Because of good mechanical strength and high dielectric strength, modern laminated insulation is being increasingly used in the electrical industry to lessen risk of current leakage for component parts of starters, switchgear, etc., for which purposes metal has hitherto been exclusively employed.

Synthetic coatings

RESINS AND CELLULOSE FINISHES. H. J. Gorer. Paint Manufacture *7*, 112–3 (April 1937); cf. Paint Technology *2*, 172 (May 1937). Natural resins used in cellulose finishes include rosin, shellac, elemi, mastic and damar, shellac and damar being particularly suitable. Ester gum is widely employed and has outstanding qualities when mixed with a natural resin such as damar. An important feature of the many types of synthetic resins is the ability to produce high gloss finishes for direct application without the usual priming coats.

GLYCERYL-PHTHALATE RESINS IN THE VARNISH INDUSTRY. René Bluma. Rev. Gén. Mat. Plastiques *13*, 151–7 (May 1937). A review.

Chemistry

THE PROBLEM OF DIFFERENTIATION BETWEEN PHENOL - FORMALDEHYDE RESINS FROM ACID OR ALKALINE CONDENSATION. J. Scheiber and F. Seebach. Angew. Chem. *50*, 278–9 (1937); cf. Chem. Abstr. *31*, 4742 (July 10, 1937). A phenol-formaldehyde resin formed by acid condensation always gives *p,p'*-dihydroxydiphenylmethane when fusion with hexamethylenetetramine, distillation in vacuo, or extraction with alkali of MgO is used. The occurrence of the *o,p*-compound indicates basic condensation. The procedure for making this test is described.

An Extrusion Press with A Background of Proven Performance

Recognized as an authority on extrusion molding, H-P-M continues to win the endorsement of Plastic Molders from coast to coast. The H-P-M Plastic Extrusion Molding Press readily reflects the vast experience behind it. Because of its many exclusive and patented features, it has opened unlimited avenues of opportunity for the Plastic Molder—backing him to the limit with speedy operation, accurate control over every press movement—and the work, minimum operating cost, a marked saving in die costs—and all-round economy. It is a self-contained machine with its own independent operating system. It will pay every Plastic Molder to write for detailed information about the modern H-P-M Press.

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PLASTIC EXTRUSION MOLDING PRESS

U. S. plastics patents

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 10 cents each

TRANSPARENT WRAPPING FOILS. N. F. Beach (to Eastman Kodak Co.). U. S. 2,084,313, June 22. Just enough finely powdered chalk (about 0.2 to 0.3%) is incorporated in cellulose acetate wrapping foil to impart a microscopic roughness to the surface without sacrificing transparency; the foil is then noncohering when rolled.

UREA RESINS. H. L. Bender and H. A. Hoffman (to Bakelite Corp.). U. S. 2,084,314, June 22. Resins are made by mildly alkaline condensation of urea with formaldehyde in presence of another nitrogen base, more basic than urea but not sufficiently so to decompose or resinify the aldehyde.

PLASTICS AND COATINGS. John W. C. Crawford (to Imperial Chemical Industries, Ltd.). U. S. 2,084,386, June 22. A polymerized methyl methacrylate is compounded with a plasticizer (e. g., pelargonic, oleic or stearic acid) in excess of the quantity which is compatible with the polymer, and plastics or coating compositions are prepared from the product.

ORNAMENTING RESINS. W. R. Hanson (to E. I. du Pont de Nemours and Co.). U. S. 2,084,393, June 22. Decorating heat-hardened phenol-formaldehyde resin articles by dipping for 2 minutes in warm (104°F.) 50% caustic potash solution, then 5 seconds in hot water, then in cold water.

POLYMERIZATION. G. M. Kuettel (to E. I. du Pont de Nemours and Co.). U. S. 2,084,399, June 22. Controlled polymerization of acrylic or methacrylic acid, in presence of a dye which retards polymerization, by dissolving polymeric esters of acrylic or methacrylic acid in the liquid monomeric esters and effecting polymerization.

METHACRYLATE RESINS. D. E. Strain (to E. I. du Pont de Nemours and Co.). U. S. 2,084,415, June 22. Making polymethacrylate resins by adding a precipitating agent to a solution of polymeric methacrylate ester in the monomeric ester, and separating the precipitate from the liquid.

LUMINOUS PLASTIC. J. P. Grenier (to Societé Francaise Helita). U. S. 2,084,526, June 22. Imparting luminescence to urea-formaldehyde resin plastics by adding a fine-grained luminous powder to the resin before the alcohol is removed by boiling in vacuum.

ABRASIVES. H. C. Martin and F. A. Upper (to Carborundum Co.). U. S. 2,084,534, June 22. Abrasive disks are made by bonding the loose grains with a heat-hardenable resin in solid particles free from any liquid plasticizer so that heat is required for molding, the shaped article being prepared by heating in the mold sufficiently so that it will hold its shape when cooled and removed from the mold, and effecting the final resin cure by heating the article outside of the mold.

DRINKING STRAWS. Otto W. Dieffenbach. U. S. 2,084,673, June 22. Transparent straws are made by helical winding of a strip of transparent cellulose derivative foil, with the edges overlapping, and a winding of a narrow reinforcing strip between the overlapped edges.

CELLULOSE ACETATE. Ernst Berl. U. S. 2,084,833, June 22. Foils or films are made of a highly acetylated cellulose, namely, the triacetate, which retains its fibrous form and has good mechanical strength. This cellulose acetate is soluble in chloroform but not in acetone, and its foils are waterproof.

PROPYLENE CHLORIDE RESIN. Chas. C. Towne (to Texas Co.). U. S. 2,084,927, June 22. A hard, brittle resin is obtained by condensing propylene chloride with 12.5 to 25% of its weight of benzene in presence of aluminum chloride.

HORN BUTTON MARKERS. H. A. Husted (to Dr. Jas. S. Reid). U. S. 2,085,023, June 29. Appropriate lettering for identification purposes is embossed in the metal shell of an automobile horn button, and the shell is then covered by molding thereon a thermoplastic material having its surface flush with the raised letters.

POROUS MATERIALS. Geo. Schneider; Wm. I. Taylor (to Celanese Corp. of America). U. S. 2,085,047; 2,085,052, June 29. Making porous cellulose derivative compositions, for heat insulation or for sponges and the like, by incorporating a solid blowing agent in the cellulose derivative and then heating, or by forming such a porous mass from a cellulose ester of a carboxylic acid and then partially hydrolyzing the ester.

DUPLICATOR MACHINE PADS. R. L. Lester (to E. I. du Pont de Nemours and Co.). U. S. 2,085,197, June 29. Duplicator sheets are prepared by coating one or both sides of a fabric with a cellulose derivative, then adding a layer of a cellulose derivative in which a tanning agent has been incorporated, and then applying a layer of gelatin.

CHEWING GUM. K. G. Blaikie (to Shawinigan Chemicals, Ltd.). U. S. 2,085,490, June 29. A vinyl ester containing not more than 0.05% aldehyde is polymerized to a viscosity between 1.5 and 6 centipoises for use as a chewing gum base having no bitter flavor.

SOLUBLE UREA RESINS. Carleton Ellis (to Plaskon Co.). U. S. 2,085,492, June 29. Urea resins which are initially soluble in water are made by condensing urea with formaldehyde at temperatures below 35°C. (95°F.) in presence of methanol.

COLOR MASTER BATCHES. Geo. Schneider (to Celanese Corp.). U. S. 2,085,512, June 29. Master batches of pigmented cellulose derivative, for use in compounding colored cellulose ester compositions, are made up by forming a paste of the pigment in a solution of an oil in a solvent which also dissolves the cellulose ester, then adding the cellulose ester and working the batch between rolls to expel the solvent and grind the pigment.

COLOR MASTER BATCHES. E. A. Grenquist (to Celluloid Corp.). U. S. 2,085,528, June 29. Making up pigmented nitrocellulose master batches by mixing the pigment first with a high boiling solvent and a thinner, adding half of the nitrocellulose, then adding the remainder of the nitrocellulose in admixture with a plasticizer, working the mixture on a roll mixer, adding more of the high boiling solvent and thinner, aging the batch and working it once more on a roll mill.

ALKYD RESINS. H. A. Winkelmann (to Marbon Corp.). U. S. 2,085,778, July 6. Compounding an alkyd resin with rubber hydrochloride.

INSULATED WIRE. W. I. Patnode and E. J. Flynn (to General Electric Co.). U. S. 2,085,995, July 6. Hard, flexible, tough abrasion-resisting insulation for electrical conductors is made by condensing hydrolyzed polyvinyl acetate with formaldehyde.

ACRYLIC ESTER RESINS. H. Plauson (to Röhm and Haas Co.). U. S. 2,086,093, July 6. Polymerizing acrylic acid esters, or their mixtures with vinyl esters, in aqueous emulsion.

SURFACING LUMBER. A. J. Norton (to General Plastics, Inc.). U. S. 2,086,187, July 6. Surface-reinforcing composition lumber by applying a coating of an emulsion of fusible heat-hardenable resin, then laying on a layer of fibrous material, heating to harden the resin, then coating again with a heat-hardenable resin and heating.

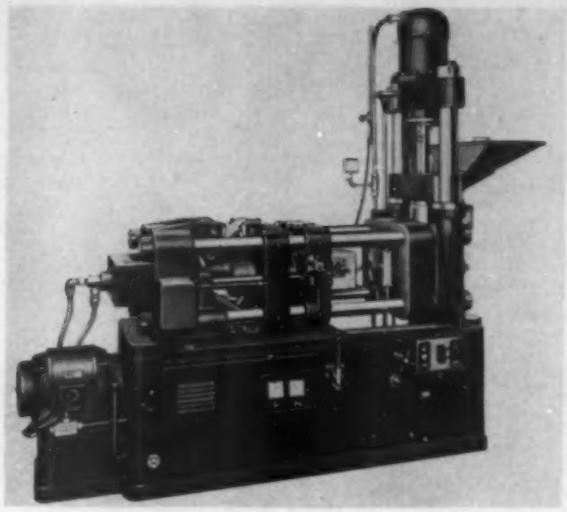
MAGNIFYING LENS. Nathan M. Stanley. U. S. 2,086,286, July 6. A synthetic resin lens is set in a rim which holds it up from the object to be examined.

ALKYD RESINS. R. Adams (to E. I. du Pont de Nemours and Co.). U. S. 2,086,458, July 6. Making a resin by esterifying a polyhydric alcohol with a hydrogenated acidic gum and a fatty oil acid.

JEWELRY. F. F. Ellingwood (to Bakelite Corp.). U. S. 2,086,493, July 6. Imparting multicolored decorative effects to molded articles by forming the articles in layers of differently colored plastics, then removing portions of the upper layer to expose the other color.

SAFETY GLASS. G. Kränzlein (to I. G. Farbenindustrie A.-G.). U. S. 2,086,506, July 6. A mixed vinyl acetate and acrylic acid ester polymer as interlayer in safety glass.

SHOP EQUIPMENT



New injection molding machine

Announcement has been made recently of a new injection molding machine by the Index Machinery Corporation, who are sole distributors for it in the United States and Canada. Fully automatic and ruggedly constructed, this new I.M.C. Lester Designed Injection Molding Machine meets the requirements for the injection of larger articles with a maximum weight of 6 ounces per casting.

The machine operates either automatically or semi-automatically. For the semi-automatic operation of the machine a single operating lever is provided; this lever is conveniently located to insure operating efficiency. The full-automatic operations of the machine are controlled by two electric clocks; all controls are arranged within easy reach of the operator and a change of position is unnecessary for complete control of the machine.

The molds are closed by hydraulic power, operating toggle joints, and these joints are firmly locked by tapered surfaces when the mold is closed. This action removes all strains from the toggle pins and insures rigid locking of the molds during injection. As a result of this construction this machine can hold the molds closed for the injection of an area of 40 square inches.

Another new feature of this equipment is the adjusting of the mold on the tie bars. This is accomplished through the use of a worm wheel by which the die plates are advanced uniformly, thereby insuring absolute parallelism of the die plates on the bars at all times. The tie bars are $3\frac{1}{4}$ in. in diameter.

The entire heating cylinder is chromium plated and is ingeniously constructed in that all adjustments can be readily made in view of the fact that the entire heating cylinder assembly swings away from the machine, affording very easy accessibility for adjustments.

The injection stroke of $8\frac{1}{2}$ in. is accomplished in 3 seconds. The base of the machine serves as an oil reservoir. This machine is a Self-Contained Unit, ready for operation as soon as the 10 HP motor is installed.

Each molded for a different purpose . . . yet each the same in its strict adherence to the highest standards of quality molding and its perfection of finish.

For each is a Norton product . . . molded by a plant that has won for itself some of the largest orders in the field . . . year after year . . . solely by adhering to quality standards and perfection of the finished part.

We invite inquiries from manufacturers who seek aid or advice in planning better moldings *plus* a source of molding manufacture that knows how to convert plans into realities without loss of quality.

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HERALDING the perfection of a new 1937 molding compound: The MAKALOT 1400 series. A heretofore unobtainable control of SURFACE shrinkage to conform to the slower shrinkage of the mass prevents the formation of "dog-skin," "waviness" and other various surface imperfections.

For the ultimate in smooth, lustrous molded surfaces try Makalot Black #1400 or its Brown counterpart #2402 and don't forget that for molding qualities, finish, etc., our 75H High Heat can't be beat.

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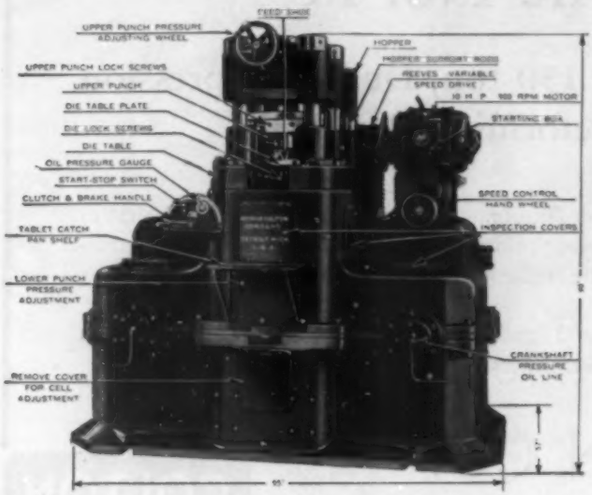
CHICAGO BRANCH: 180 N. WACKER DRIVE

SHOP EQUIPMENT

Preforming press

Arthur Colton Co. announces a new 150-ton dual compression preforming press which applies pressure to both sides of the tablet thereby overcoming die friction and obtaining uniform density throughout the tablet. The

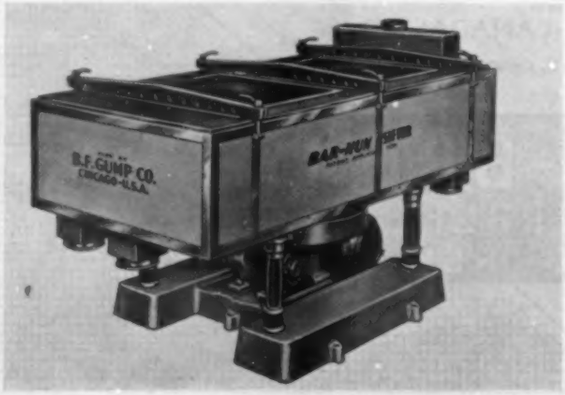


press has a toggle action which allows a longer molding period while on the compression stroke and more time for air to escape from the preform. This press represents a new design from the ground up. A folder of specifications is available.

Rotary sifter

The Bar-Nun Sifter, a rotary motion sifting unit, is a recently announced product of the B. F. Gump Co. Designed principally for sifting and rebolting flour and other powders, these sturdy, compact units can also be used to advantage for scalping, grading and separating many kinds of dry and granulated materials.

The mechanically controlled, complete rotary motion of the entire sieve area produces exceptionally large capacity per square foot of silk or wire bolting cloth. A complete separation of tailings and finished product is obtained on each individual sieve; and other features



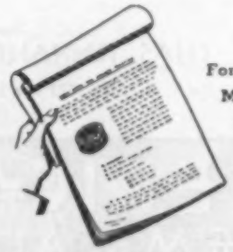
Entrusted to **Carpenter**
MOLD STEEL

Again the job of molding the world's largest one-piece plastic has been entrusted to Carpenter Mold Steel.

As bigger and bigger molds become the order of the day, Carpenter remains the preferred steel of men who cannot afford to gamble.

Four months of skilled labor were invested in this five ton mold machined from steel supplied by Carpenter. It is used to produce the 26½ inch Plaskon light reflector shown which has an area of 550 square inches.

Whether your mold requirements call for gigantic proportions or intricate miniatures, there is a Carpenter Mold Steel to match the job.



For working data on Carpenter Mold Steels, send for a copy of this helpful bulletin. It's free to mold steel users in U. S. A.

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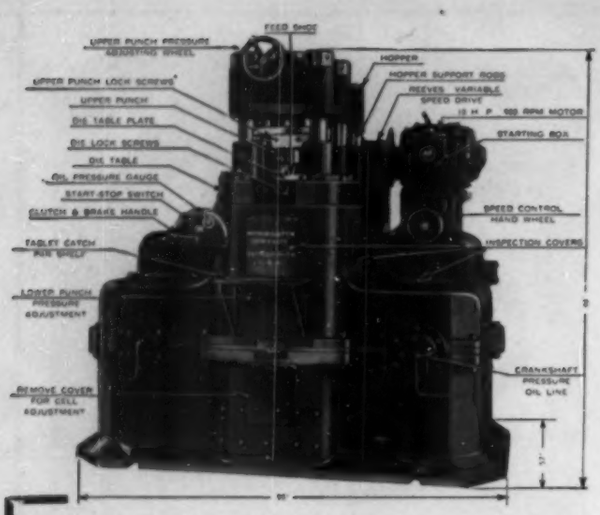

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The finest machine of its kind ... specially designed to meet the new standards of large unit molding. All working parts sealed against dust. Pressure feed oiling to all bearings. Maximum cell depth ... $3\frac{3}{4}$", maximum dia. round tablet ... $4\frac{1}{2}$". Speed 25 to 30 tablets per minute. Double toggle, twin crankshafts ... hence compression from *both* sides of tablet insuring uniform density throughout.

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SHOP EQUIPMENT

include easy accessibility for cleaning and interchangeable sieves for accommodating various conditions for grading or sifting. A four-page bulletin describing these sifting units is available.

Packer polishing and buffing machine

A rotary type automatic polishing and buffing machine has recently been announced by The Packer Machine Company. One man can efficiently operate it as it is fully automatic with a centralized control. The Jacks, holding the motor driven wheels, can be independently set and adjusted depending upon the type of work to be polished and buffed. This is an advantage when irregular shapes and contours are polished and

buffed, as one complete cycle of the work table completes the operation. Work table speeds are easily controlled with hand levers by the operator from his central station, as well as stopping and starting the machine from a switch within easy reach.

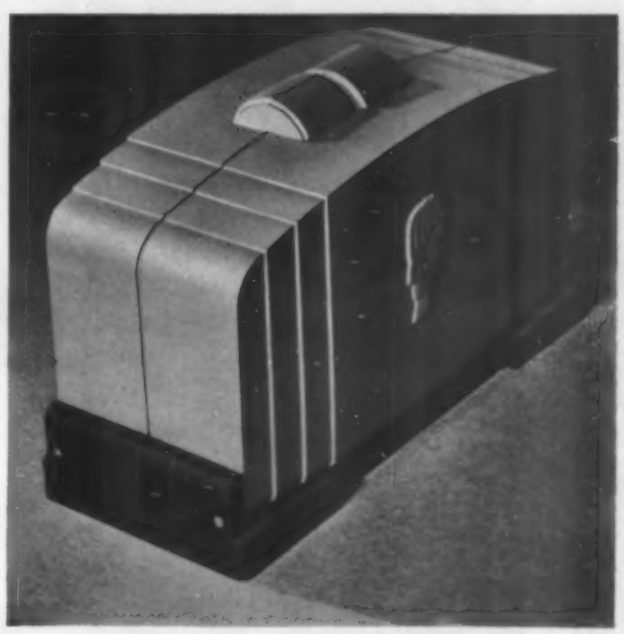
Totally enclosed, dustproof ball-bearing motors of various horsepowers (up to $7\frac{1}{2}$ HP) are available and all mechanism is dustproof oil-contained housing.

Multiple-orifice flow-meter for high pressures

A multiple-orifice flow-meter of the U-tube type, suitable for measuring a wide range of flow-rates at pressures from 200 to 600 lbs. per square inch, is described in Bulletin No. 5 of The Merian Company. All parts subjected to stress are unusually strong, and the front of the instrument is protected by a heavy shatter-proof glass plate. By loosening the gaskets of the orifice disc, it may be revolved so as to use any of four different sizes of orifice, according to the quantity of fluid being measured. The complete unit is stated to consist of a high-pressure manometer, multiple orifice disc, connecting piping, bypass valve, and wrench and cleaning brush.

Just a beginning

Plastic moldings—made *exactly* to your specifications and designs—in any of the popular plastic compounds—in any color—to fit *precisely* the purposes for which they are intended. These things you expect when you place an order for molded plastics. But to the Auburn Button Works that is just a beginning—our service goes beyond this. More than 60 years molding experience has taught us many short cuts to economy that do not curtail quality. An outstanding staff of engineers and skilled die makers assures the perfection of your finished product—whether it is a container of sales compelling attractiveness or an essential part of your product made to the closest tolerances.



Containers or packages that will increase sales to the Holiday trade may be still secured if you place your order *now*. You can rely on Auburn for a better product—delivered on schedule.

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SHOP EQUIPMENT

Hand grinder

The Dunmore Co. has issued an interesting leaflet showing a capable-looking hand grinder for machining and polishing in close quarters. The grinder weighs but 2 lbs. 12 oz. which indicates its convenient use in mold work, in fabricating plastic materials or in making models of any sort. Dunmore was originally custom-built for a large automobile manufacturer but the demand for this type of powerful compact equipment for off-hand grinding makes it available now at a reasonable price. Ask us for Bulletin No. 10.

Skid platforms

The many types of skid platforms that may be used in conveying materials, goods, merchandise, parts and products by the lift truck method of interior transportation will be found fully illustrated in a new colored folder just issued by Lewis-Shepard Company, materials handling equipment manufacturers.

•

Taber Abraser for testing

The Taber Instrument Company announces the Taber Abraser, a precision testing machine for measuring the wear resistance, toughness, adhesion and rub-off qualities of surface finishes such as enamels, electroplate, anodizing, linoleum, molded plastic sheets and leather

coverings. In the Research Laboratory, the Taber Abraser is useful for testing new formulas, control work, checking competitive samples, grading, etc. Its lightness and portability make it possible for traveling sales technicians to prove their claims and to check competitive materials on location.

NEWS and NOTES

Boonton enlarges plant

The plant at Boonton Molding Company, Boonton, New Jersey, has recently been enlarged by 2,200 sq. ft. which provided a much needed loading platform with receiving, shipping and storage space located conveniently nearby. The rear end of the addition has been fitted out for the mold service department which previously shared space with mold repairs. Steel racks provide storage for active molds while inactive molds are placed at the far end of the extension.

In addition to the extra floor space made available, the former warehouse wall has been replaced with concrete and sash construction which improves the appearance of the plant and gives ample light in the pillroom, office and raw material control section.

"We look better, feel better, and hope to do better after this corporate face-lifting operation," says George K. Scribner, president of the company.

Tentative program of the division of paint and varnish chemistry

R. H. KIENLE, *Chairman*
G. G. SWARD, *Secretary*
Thursday, September 9—Organic Plastics Section
G. M. KLINE, *Chairman*

The following list of papers to be presented at the meeting of the American Chemical Society in Rochester, N. Y., during the week of September 6th will be of interest to plastics technologists

9:00— 1. Harold Weinberger, Benjamin B. Schaeffer and Wm. Howlett Gardner. Nature and Constitution of Shellac. XIV. The Chemical Constitution of Shellac.

9:30— 2. D. E. Strain. Polymerization of Methyl Methacrylate in Organic Solvents.

10:00— 3. H. F. Meindl. Some Higher Alkyl Methacrylates.

10:30— 4. O. E. Anderson and E. R. Perry. Influence of Resin Content and Cure on the Properties of Phenolic Laminated Plate.

11:10— 5. Eugene C. Bingham. Consistency Measurement.

2:00— 6. A. G. Hovey and T. S. Hodgkins. Quali-

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Succinic Anhydride
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INTERMEDIATES

NEWS and NOTES

tative Determination of Glycerol and Ethylene Glycol in Dilute Aqueous Solution.

2:15— 7. Donald L. Gibb and Russell Bradshaw. Ethylcellulose Plastic.

2:45— 8. Gustavus J. Esselen and Frederick S. Bacon. The Plastics Industry and Its Raw Materials Demand.

3:15— 9. Harold A. Levey. Film Forming Methods.

3:30—10. Harold A. Levey. Film Forming Surfaces.

Friday, September 10—Protective Coatings Section

9:00—11. R. M. Goepp, Jr., and K. R. Brown. Resins from the Hexahydric Alcohols, Mannitol and Sorbitol.

9:20—12. C. L. Mantell and A. Schettino. Solvencies of Damar and Viscosities of Its Solutions.

9:40—13. C. L. Mantell, R. W. Allan and A. Schettino. Solubilities of the Commercially Important Natural Resins in Paint, Varnish and Lacquer Solvents and Waxes.

10:00—14. John B. Dorsch and James K. Stewart. The Effect of Non-Volatile Material on Solvent Balance.

10:30—15. T. A. Kauppi and S. L. Bass. Evaluation of Solvents for Ethylcellulose.

11:00—16. V. H. Turkington, R. C. Shuey and L. Shechter. Influence of Phenolic Resin on Linseed Oil Varnishes.

11:30—17. G. M. Kline, H. F. Schiefer and C. G. Malmberg. Estimation of Tautness of Airplane Fabric Doped with Various Plastics.

2:00—18. L. Auer. Colloid Chemistry of Drying Oils.

2:45—19. S. O. Sorenson, Carl J. Schumann, John H. Schumann and Joseph Mattiello. Oiticica and Tung Oils. Changes in Physical and Chemical Properties During Heat-Bodying and Air and in Carbon Dioxide.

3:15—20. W. W. Kittelberger. The Relationship Between Permeability to Moisture and Durability of Paint Systems.

3:45—21. A. E. Jacobsen. A Physical Study of Two-Coat Paint Systems.

4:15— BUSINESS MEETING.

S. P. I. at Wawasee

The western section of the Society of the Plastics Industry gathered at the Spink Wawasee Hotel and Country Club, Lake Wawasee, Indiana, on July 19 for two days of golf. Sixty-two members attended. Bill Kelly, Chicago Molded Products Corp., and Treasurer of S. P. I., presided at the banquet Monday evening at which minutes of the previous meeting (Shawnee, May 24–25) were read. Letters from those unable to attend were also read.

Among those applying for membership in the Society, some of whom have already been accepted, are:

George Kuhn, Kuhn and Jacob; Henry Kasch, W. G. Davidson, H. M. Howison, Kurz Kasch Inc.; John G.

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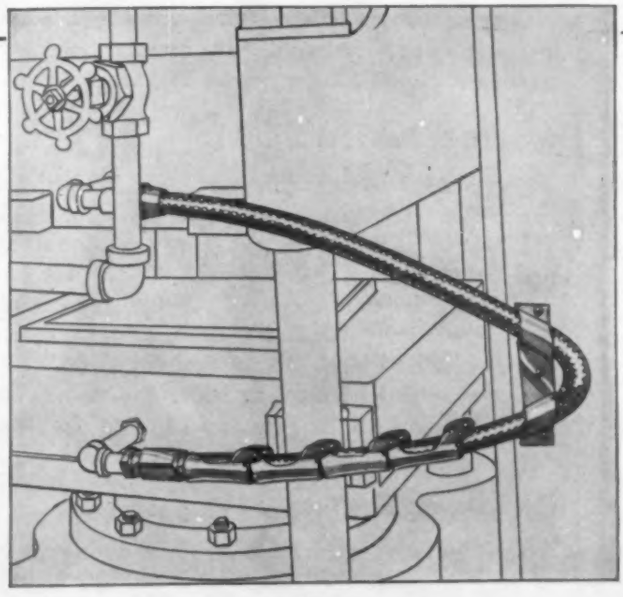

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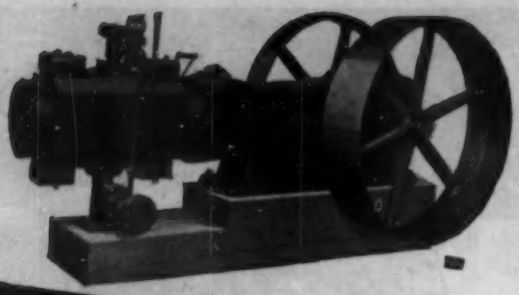
Rex Self-Drain Supports—a Chicago Metal Hose Corporation engineering development—permits free movement of the unit at all times without allowing it to sag below the horizontal, and controls the flexing of the hose without unnecessary strain. Furnished as complete unit. Write today for new catalog illustrating and fully describing the many advantages of Rex Self-Drain Supports and Rex-Weld Flexible Metal Hose for platen press application.

CHICAGO METAL HOSE CORPORATION
Formerly Chicago Tubing & Braiding Co. (Established 1902)
Maywood, Illinois (Chicago Suburb)

REX-WELD "Super-Service" Jointless Flexible Steam Connections



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HIGHER TEMPERATURE?

If you have a service requiring steam at higher pressure or temperature than present system can supply—and where it is necessary that temperature be continuously maintained within close limits—a Pennsylvania Steam Booster Compressor will avoid the expense for additional boiler plant equipment.

Bulletin 163 and other data on request.

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NEWS and NOTES

Slater, G. W. Carpenter, C. S. Blackwell, H. I. Simpson, C. H. Penning, John B. Scheer, J. P. Tokarz, Spencer E. Palmer, Robert Grant, Tennessee Eastman Corp.; A. M. Gibson, Durite Plastics, Inc.; A. F. Markus, O. M. Hanson, Detroit Molded Products; Bevis Longstreth, Thiokol Corp.; J. Fenlin, Walter Longacre, C. E. Brocklebank, Jr., Bakelite Corp.; J. H. Dubois, Gorham Co.; F. C. Rowley, General Plastics, Inc.; J. C. Miles, General Electric Co.; E. G. Engman, Eclipse Molded Products; W. A. Weymouth, National Lock Co.; F. I. Donahue, Resinox Corp.; A. J. Schmitt, American Phenolic Corp.; Ray Alden, unattached; Charles A. Breskin and Alan S. Cole, of MODERN PLASTICS.

A change in the awarding of prizes for the golf tournament was made this year. Instead of the usual presentation of golf equipment, cash awards were made. Low net of 65 was made by Paul Tietz. Low gross of 78 by Walter Longacre. Least puts 26 to M. C. Bachner. This latter was a record as the lowest number of puts previously reported was 29.

The prize for the most 6's went to W. L. Dunnican. Most 7's to C. M. Phillips. Most 8's to Joe Brown. Most 9's to J. H. Dubois. In addition to the above there was also a kickers handicap which was drawn by lot and first award of $20.00 went to R. B. Harrison. Second prize of $10.00 to W. B. Longacre. Third prize of $6.00 to J. H. Dubois and fourth of $4.00 to W. J. Dunnican.

Gene Engman of Eclipse Molded Products, Milwaukee, provided an unscheduled event, amusing to everyone but Gene. He dived into the water to escape the heat, and came up missing his teeth. A life guard finally rescued the teeth, cost Gene a dollar. Aside from this there were no casualties, weather was fine, and everybody left with the feeling that the get-together was well worth while.

DAN R. LEWIS

G. E. signs for World's Fair

The General Electric Company took its initial step last month toward large-scale participation in the New York World's Fair of 1939. The company contracted for 68,339 square feet of space on which it will erect a great exhibit building to house displays illustrating the role of electricity in the "World of Tomorrow." The structure will have a prominent location in the Production Zone just north of Horace Harding Boulevard on the Central Mall leading from the Theme Center to the Marine Amphitheatre and the Amusement Area.

New York Lamp Show

The New York Lamp Show was held during the week of July 19–23 at the Hotel New Yorker, under the George F. Little Management.

Celluloid Corporation and the du Pont Company, both had exhibits to display the appropriateness of their lampshade materials for use in any period room.

Table lamps with wood and pottery bases shown with shades in Cannes Rust color with Nail Head Finish, and some were the color of Shantung. Photo, courtesy Celluloid Corp.

Steele and Johnson Manufacturing Company, showed a desk lamp with a molded Beetle bowl trimmed either with copper-tone or bronze bases, and this item was one of the few new applications of plastics to be seen.

Celluloid Corporation showed Lumarith shades combined with wood, alabaster and glass bases with harmonizing drapery fabrics in the background.

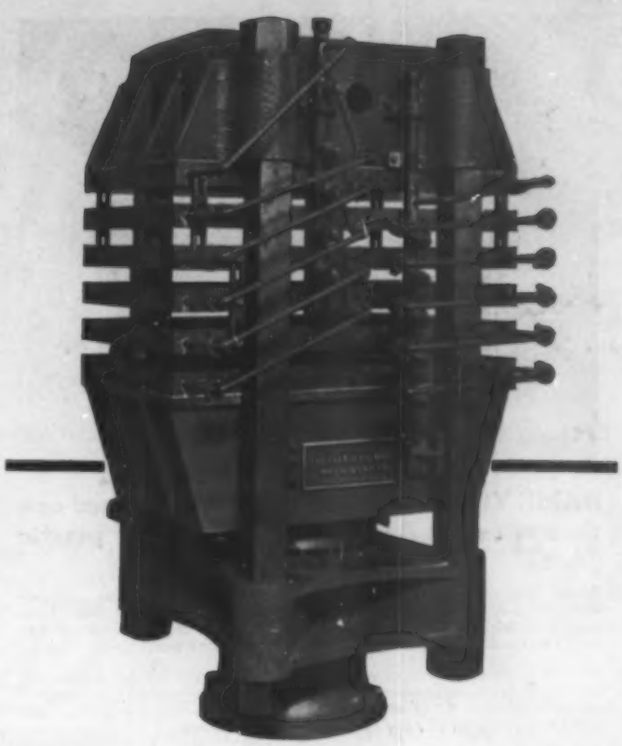
Lamp with copper base and a Cafe au Lait shade trimmed with brass and leather finish, Aztec pottery lamp with Nougat Beige shade and fine linen finish, Chinese base with Amber color shade trimmed in green were among those shown at Celluloid Corp.'s exhibit

The du Pont Company framed illustrations of a number of rooms in which Sundora lampshades were used and by means of back lighting the photographed lamps were illuminated. Surprising as it may seem few new uses of cast resins were introduced during the last year.

George F. Little Management also announces the Fall Gift Show to be held at the Hotel Pennsylvania, during the week of August 23–27.

New radio cabinet material announced

General Plastics, Inc., announce a new Durez molding material especially developed for radio cabinets and other large housings where appearance is important. It is called Durez 113 black and is being used on several of the latest plastic cabinets now in production. Feature of the new material is the deep rich black color obtained, the long draws possible. It also permits hard buffing without danger of showing filler-spots.



6 REASONS WHY

Manufacturers of High Grade Equipment Specify

BARCO

Swivel Joints

The bronze balls, stainless steel springs and extremely hard, long-wearing, non-metallic gaskets provide these outstanding superiorities for Barco Swivel Joints:

1. Steam does not injure the gaskets. 2. Compensation for slight side movements. 3. Extra long life. 4. Automatic adjustment. 5. Fluid tight under the strains of alternating steam and cold water. 6. Freedom from condensation leaks.

The production savings which these features make possible through uninterrupted operation will be found to contribute largely to manufacturing profits.

Write for Catalogue 256

BARCO MANUFACTURING COMPANY
1813 Winnemac Avenue
Chicago, Illinois

NAME YOUR CAR . . . and you've named one that relies on American Insulator for plastic parts!

Almost every car that leaves the lines today carries one to as many as twenty plastic decorative parts molded by American Insulator engineers. From horn-buttons to defroster heads, from escutcheons to regulator handles—you'll find AICO skill and genius for finer molding making your car a better buy.

As with the motor industry, so with many others. For this firm has grown with growing fields . . . meeting newly arising needs with new machines, new method and new outlook. All of which bespeaks our ability to meet and conquer your problems . . . though they may never have been met before.

Write—

AMERICAN INSULATOR CORP.
NEW FREEDOM PENN.

Best TO DATE!
The ALDRICH Central Hydraulic Pressure System.

- Aldrich high efficiency plunger pumps reduce operating costs.
- Aldrich Central Hydraulic Pressure Systems minimize maintenance costs.
- Either Hydro-Pneumatic or Dead Weight Accumulators produce an even load current with minimum pumping capacity.
- Fire hazard is elimated by the use of non-inflammable hydraulic media.

ALDRICH

THE ALDRICH PUMP CO.
ALLENTOWN, PENNA.

NEWS and NOTES

Bowlus leaves American Insulator

B. H. Bowlus, development engineer at the American Insulator Corp., New Freedom, Pa., has severed his connection with the plant.

Mr. Bowlus came with the company two years ago from the Body Hardware Division of the General Motors Corporation in Detroit. He is a member of the American Society of Engineers and a member of the newly formed plastics committee of the American Society for Testing Materials. His future plans are uncertain at the moment.

Richland goes to England

Philip Richland, vice-president of Gemloid Corporation, sailed recently on a business trip to England. While there, he expects to visit his mother in London.

Revolite swatches

The Zapon Division of Atlas Powder Company, makers of Revolite, has just issued sample swatches of 36 different colors and weights of this material which has a synthetic resin surface. Revolite is processed with flexible Bakelite and finds many uses where a waterproof fabric is required. Light and dark colors are shown in the samples, as are copper, silver and gold.

Exposition of Chemical Industries

Plans for the Exposition of Chemical Industries are unusually well advanced at this time, four months in advance of opening. The Sixteenth Exposition of Chemical Industries will be held at Grand Central Palace, New York, December 6 to 11, 1937. Three floors of the Palace have been reserved for the event and at the present time all available space on the first and second floors has been sold to exhibitors and one-third of the total available space on the third floor is under contract. The list of exhibitors reads like a Who's Who of the American chemical industry and beyond this field a large number of nationally known concerns are represented because of their indirect connection with chemical manufacture.

Unique in the world, the Exposition of Chemical Industries reaches a world market. At the last Exposition, held in 1935, the attendance was from 1166 cities and towns in 40 states of the United States, and from 102 cities and towns in 32 foreign countries and 8 cities and towns in 3 U. S. Foreign Possessions. The registered attendance was 38,707. Admission is without charge and by registration or invitation only. No tickets are to be sold to the general public.

Foaming reduced

Foaming has always been a source of trouble in the manufacture of solutions of glue, casein, shellac, etc. Foamex recently introduced by the Glyco Products Co. Inc., successfully inhibits foaming, it is claimed, without

interfering with the other properties of the product. The addition of as little as $1^1/_2$ ounces of Foamex to 12 gallons of solution is generally sufficient.

Manufacturers of paper coatings, latex compositions, leather finishes, textile finishes and sizings and adhesives will find that Foamex is very helpful it is reported, not only in dissipating foam in mixing tanks but for eliminating specks, pinholes, etc., in finished goods.

Represents French firm in U. S. A.

Chemical Improvements, Inc., 18 East 41st Street, New York City, was recently founded with the view to negotiate licensing rights under patents and secret processes belonging to Ste. Nobel Française an dvarious other French firms.

Societé Nobel Française, located in Paris, is one of the prominent manufacturers of nitrocellulose and was a pioneer in the field of phenol-formaldehyde and urea-formaldehyde cast resins in France. This company claims to have been the first to manufacture commercially, water clear U. F. cast material under the name of Prystal, a trade name which was acquired some time ago by Catalin Corp., New York City.

The company also developed U. F. molding powder under the name of Prystaline and several urea-formaldehyde and phenol-formaldehyde emulsions and solutions for impregnating purposes. Its recent interests have centered on the prospects and future of vinyl resins and extensive research work on developments and improvement in the manufacture of these materials.

It is the intention of the Societé to make its research and commercial experience available to American industry through the channel of an American company which will be able to supply full technical help to manufacturers and users of plastics.

Henry S. Otto is president of Chemical Improvements, Inc., and Robert S. Otto is vice-president. Both officials are from the firm of Albert T. Otto & Sons, which has for many years been negotiating licensing rights and has made available to American industries many valuable and interesting European inventions.

Jester now in Chicago

Simeon Jester, Jr., formerly with the sales department of the Philadelphia office of American Engineering Company, has been transferred to their Chicago office. This appointment takes effect July 15th. Mr. Jester will supervise the western Hele-Shaw Pump and Lo-Hed Hoist agents as well as be responsible for direct sales of marine deck auxiliary equipment. Mr. Jester is a graduate of Massachusetts Institute of Technology, and has been connected with the American Engineering Company for the past two years.

Plywood exteriors speed construction

By using large fir plywood panels for the exterior as well as for walls, partitions and floors inside, it was possible to build a large three-story 96 by 86 foot factory

Lupomatic

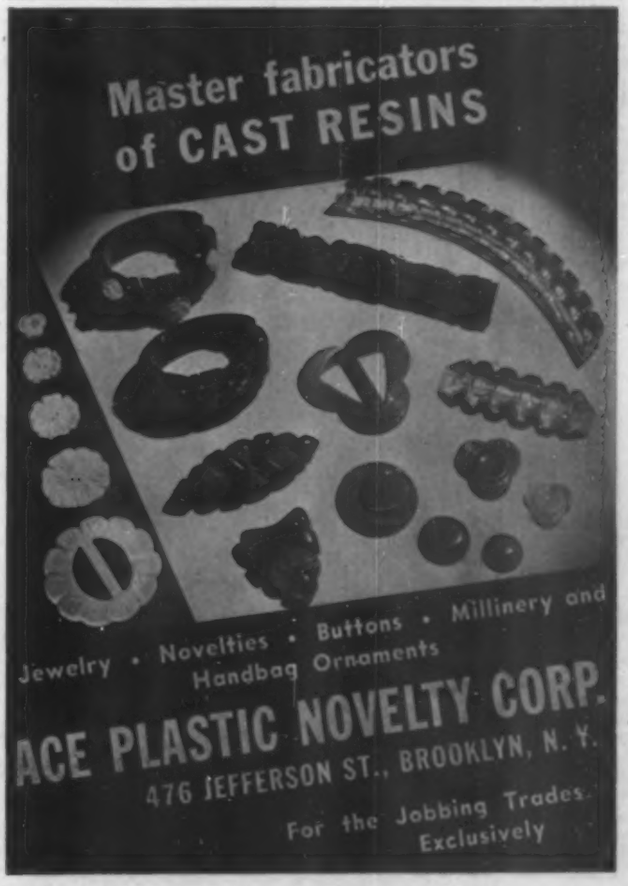
EVERY DAY...MORE PLASTIC PARTS ARE FINISHED WITH LUPOMATICS THAN WITH ALL OTHER TYPES COMBINED!

Lupomatic finishes are the product of years of experiment and experience in making and perfecting tumbling barrels.

Insist on Patented Lupomatic Equipment, Compounds and Processes for *perfect* results in your Finishing Dept.

No problem is too big or too small for us. Our Experimental Dept. is always on hand with up-to-the-minute data to assist you.

LUPOMATIC TUMBLING MACHINE CO., Inc.
4512 Bullard Ave. New York, N. Y.
Mfgrs. of LUPOMATIC Tumbling Equipment and supplies for every purpose, Slicing Machines, Carving Machines, Jig Saws.



LEAROK

The Clean Buffing Compound

LEAROK has no "free grease" in it. It is clean. It doesn't get into crevices and ornamentations. This, coupled with its excellent buffing properties, make it ideal for finishing plastics. LEAROK can be obtained tinted to match the color of the finished article.

Send a sample of your work for our recommendations.

The Lea Mfg. Co.
Waterbury, Conn.

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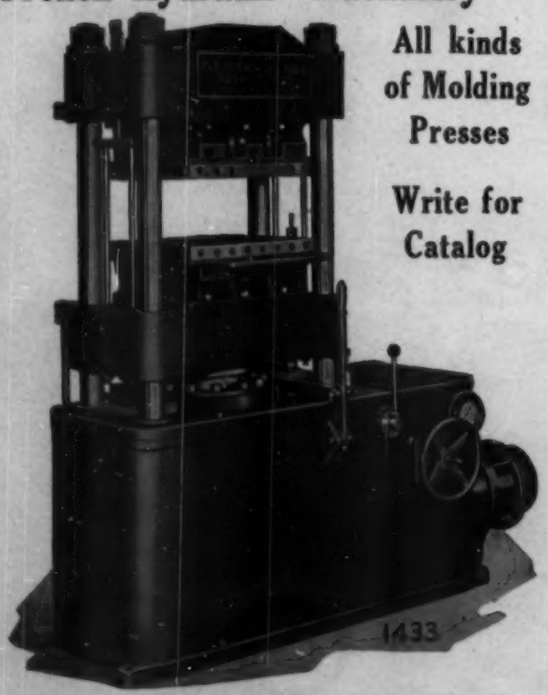
686 Notre Dame St. West, Montreal, Canada

French Hydraulic Machinery



All kinds of Molding Presses

Write for Catalog

Self-Contained Molding Press, Patent Pending

***The* French Oil Mill Machinery Co.**
Piqua, Ohio

NEWS and NOTES

addition and warehouse in Seattle recently in seventeen working days . . . from foundation laying to occupancy.

The speed made possible through the use of these large 4 by 8 foot panels accounted for the saving of 30 percent in time on the exterior and at least 50 percent on the interior, Walter Lawshe, chief engineer for the project, stated. He says in addition:

"We also cut the amount of nails to a fourth of what we would have used with the usual shiplap, building paper and 'rustic' siding construction . . . and eliminated the building paper entirely. We got a tighter wall, better insulated and more rigid building throughout."

Plywood for exteriors has become one of the accepted materials since the bonding of the plies with hot press and resin has become generally adapted. This hot press method makes fir plywood panels "100 percent waterproof," in the words of the U. S. Forest Products Laboratory, Madison, Wisconsin. Seven thousand feet of this plywood bonded with Lauxite resin, was used for the exteriors. Three-eighths inch hot press fir plywood, three ply . . . good one side, sanded was specified. It was treated at the factory with Rezite Sealer for priming purposes, to prevent grain raising and checking and was also given further protection of the ubiquitous synthetic resins by a special synthetic resin bound paint, manufactured by the firm for which the building was erected. This paint has the advantage of sealing and weatherproofing as it beautifies. Vertical joints were sealed by a resin bound putty and the horizontal joints protected with a Z-shaped flashing of galvanized iron (also treated with the sealer to prevent corrosion) with overlaps of one-quarter inch on outside and inside. Flashings of galvanized iron around window ledges protected any exposed edges of plywood.

Fifteen thousand feet of regular fir plywood . . . not hot pressed . . . but its surface sealed with the same sealer, was used on the interior of the factory.

The owners are highly pleased with the saving in time and expense this rather novel method of building represented, and state that they have a more rigid, stronger, better insulated wing to their plant than the rest of their buildings erected in the conventional manner.

Building material from wood

Farley & Loetscher Mfg. Company have produced a laminated material from ground wood or chips and bonded with a synthetic resin. This product, called Farlite, was originally intended for use in making doors, but it was further developed for table tops, panels and similar applications in construction.

Loetex panel board is a synthetic product reported to be highly waterproof and may be used as a miscellaneous building board without further treatment. Because of the raw material's low cost, these products should be interesting for use in the building field, and a booklet describing them is available.

G. E. sales increase

Orders received by General Electric Company during the first six months this year amounted to $217,265,619, an increase of 59 percent over the $136,968,597 received during the same period last year, president Gerard Swope announced today. The record first half year was in 1929 when orders received amounted to $220,716,456.

Orders received during the second quarter of 1937 amounted to $111,518,589, compared with $77,398,718 during the corresponding quarter of 1936, an increase of 44 percent. The second quarter this year was the largest since the third quarter of 1929.

Annual Meeting of the Association of German Engineers

The 75th Annual Meeting of the Association of German Engineers will take place at Kiel. Short reports of about 500 words on many of the lectures to be read there may be of interest to American readers. The subjects are: The growing use of plastic masses in shipbuilding and ship equipment.

The growing use of light metals and light metal foil insulation in ships.

The fight against noise in industry and experiments made in this respect with special noise gauges.

Extensive tests with models, with the purpose of improving motor vehicle springing.

Wiegand goes to France

Newly discovered properties of colloidal carbon critically affecting its applications in rubber, paints, lacquers and inks, were described by William B. Wiegand, director of carbon research of the Columbian Carbon Co., before the Congress International de Caoutchouc, world organization of rubber technologists, meeting in Paris recently.

The ionic and hydrolytic adsorptive power of colloidal carbon, Mr. Wiegand has found, affects its chemical character as to acidity or alkalinity (pH value) and this may now be exactly evaluated. This property is of special significance in rubber, paint, ink and other fields as affecting the character of mixtures of colloidal carbon with other materials.

Chemurgic Council organizes on permanent basis

At the closing session of the Third Dearborn Conference, which was attended by over 1,200 leaders of agriculture, industry and science, representing 42 states, a resolution was unanimously adopted to incorporate on a national basis "for scientific and educational purposes" under the laws of Michigan providing for the organization of non-profit institutions.

Twenty-three states are now embraced whether in state or regional Chemurgic Councils. At the Dearborn Conference representatives of ten additional states in attendance completed tentative plans for similar organizations. Each state Chemurgic Council will constitute a separate independent entity, free to develop its own program and policies without interference.

PRECISION MOLDING LIMITS

POSITIVELY CONTROLLED.

HYDRAULIC MACHINERY ELMES

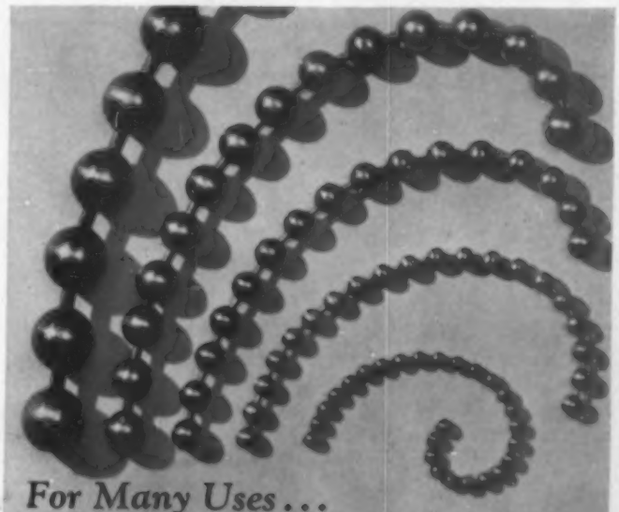
Housing type presses are built in any size or capacity, They are fitted with both steam and hydraulic gages, and top and bottom knock-outs—

Fully automatic or semi-automatic control as desired.

BUILT TO SUIT

PLASTIC MOLDING UNIT No. 4693

CHARLES F. ELMES ENGINEERING WORKS
225 N. MORGAN STREET CHICAGO, ILL.
Telephone—HAY market 0695



For Many Uses . . .

BEAD CHAIN*

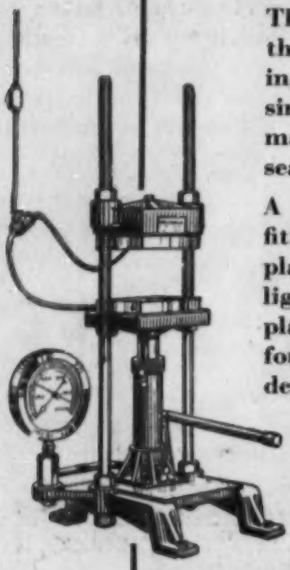
Non-kinkable, metal BEAD CHAIN* is made in the sizes shown here, of varied metals and finishes, for beauty and utility. There are pendants, couplings and attachments for any assembly.

Our engineering and design service is available to fabricators, molders and others in the Plastic industry, to assist in the development of new and improved products.

THE BEAD CHAIN MANUFACTURING CO.
*TRADE MARK REG. U. S. PAT. OFF.
BRIDGEPORT, CONN.

The CARVER LABORATORY PRESS

For Plastic Molding



There is nothing like this little press for testing plastic materials, single cavity molds, making samples, research and control work.

A self-contained unit fitted with electric hot plate—just plug into light socket. Steam hot plates if desired. Write for catalog giving full details.

FRED S. CARVER
HYDRAULIC EQUIPMENT
343 HUDSON ST., NEW YORK
In London: BAKER-PERKINS, LTD.

CLASSIFIED

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➡ **FOR SALE: 1-Size 11½ Type VI-M Class BSC, W&P, Baker Perkins Mixer with 20 H.P. motor. 1–12″ Mikro pulverizer and 1–12″ x 12″, 30 ton 4″ ram Watson Stillman hydraulic press. Reply Box 202, Modern Plastics.**

•

➡ **INDUSTRIAL COURSES: Paints, Varnishes, Cellulose Esters, Plastics, Synthetic Resins, Dyes, Oils, Waxes, etc. (30 fields). Chemistry, Chemical Engineering, and Bacteriology. Class (if registration warrants) or mail. INDUSTRIAL CONSULTANTS, 3404M Baring St., Philadelphia, Pa.**

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➡ **WANTED—PREFORM MACHINES: Will pay cash for idle or surplus preform Presses—also Hydraulic Presses, Pebble Mills, Mixers, Sifters, etc. Send us your list. Reply Box 191, Modern Plastics.**

•

➡ **FOR SALE: 1-Colton No. 5, Preform Machine 2½″, with texrope drive and motor; 1 Watson-Stillman hydro-pneumatic Accumulator, high and low pressure; 1—Southwark Intensifier. WANTED: Several Hydraulic Molding Presses, all sizes, preferably with large rams. Reply Box 197, Modern Plastics.**

NEWS and NOTES

Two new General Plastics buildings

Two new buildings are being constructed on General Plastics' North Tonawanda site as part of the company's 1937 building program. One of the buildings is a large raw material warehouse with a new railroad spur, and the other is a three-story resin plant. A third new plant is expected to be started shortly.

New York representative

The Neville Company, manufacturers of coal-tar products, located in Pittsburgh, announces that Calo and Lydon, 90 West Street, New York City, have been recently appointed as sales representative of the company in the metropolitan district.

World's Fair contracts signed

Contracts for lots for three exhibit buildings to be erected at the New York World's Fair, 1939 were made public by Grover Whalen, president of the Fair.

The American Gas Association, representing the manufactured and natural gas industry of the country, has signed a contract for 122, 008 square feet of ground in the Community Interests Zone of the Fair.

The Consolidated Edison Company, in another contract, has taken 75,183 square feet, costing $25,383.15, in the Means of Production Zone. O. H. Fogg, vice president signed the contract for the plot, which is located on the Mall leading from the Perisphere to the New York State Amphitheatre.

The third firm, the Johns-Manville Corporation, has signed a contract for a lot covering 29,317 square feet and costing $17,438.19. Also located in the Community Interests Zone, the lot will front on the subway entrance plaza. Next to it, across the main avenue leading from the plaza to the Theme Center, will be the focal exhibit.

David Sarnoff, president of the Radio Corporation of America and Grover Whalen, have signed an agreement whereby television will be given a public demonstration by the Radio Corporation of America and the National Broadcasting Company at the World's Fair which is dedicated to "The World of Tomorrow."

Man-made sponge

A fine-pore cellulose sponge for personal use following a cellulose sponge with larger pores used chiefly for household cleaning purposes is announced by the du Pont Company.

Made of highly purified wood and cotton cellulose pulps, this new sponge-like construction is obtained through exacting chemical control and reactions. Said to be tough and durable it becomes soft and pliable when wet, and it will absorb 95 percent of its own cubical content or about 25 times its own weight in water.

Slate-like blackboard finish

A new air-drying lacquer enamel, which finishes wood, fiber, wall board, cardboard, pressed paper and other materials with a surface resembling slate, has been developed by Maas and Waldstein Company, makers of industrial finishes.

This new finish, which is known as "Slatite," takes chalkmarks like slate, and the marks can readily be removed with an ordinary blackboard eraser, according to the manufacturer. The finish is washable and durable, and, when it becomes worn, can be readily renewed by spraying on another coat.

Motor Show in Melbourne

Die Casters Limited, Melbourne, Australia, whose successful use of Tenite in covering automobile hardware has been reported internationally, exhibited their products at Ye Coronation Motor Show held at Melbourne in May. Although our illustration of their exhibit booth is necessarily small, it indicates the inherent enthusiasm with which this company enters into national events. The booth is modern, in splendid taste, and illustrates the progressive attitude of a young and growing concern

Die Casters Limited exhibit their products at Ye Coronation Motor Show in Australia

in the plastics field which many American firms could emulate with advantage.

Die Casters Ltd. developed a satisfactory method for molding cellulose acetate on metal cores which has been the foundation on which they have built the plastics division of their business. An executive of the firm recently completed a tour of the United States in which he compared notes and exchanged ideas with American manufacturers who are engaged in similar uses of acetate.

ERIE
MOLDED PLASTIC DIALS

Here is a new application of molded plastics to illuminated instruments. Injection molded in one piece, these translucent dials require no polishing or etching.

When lighted from the rear, raised figures and degee markings appear darker than the background, are easy to read. Infinite variety of possible colors makes for unusual beauty and striking combinations with the rest of the instrument.

If you make indicating instruments, or use them in your product, our design engineers will be glad to show you how Erie Injection Molded Dials can improve their utility and appearance.

ERIE RESISTOR CORP.— PLASTICS DIVISION
640 W. 12TH ST., ERIE, PA.

PLASTICO
MOULAGE
MATERIALS
for Models
Samples
Experimental Moldings
Reproductions

Plastico is used in making accurate plastic reproductions of animate or inanimate objects in 3 dimensions in the minutest detail. It is extensively used in Art, Commerce and Science. Plastico materials are moderate in cost—the technique is simple—the results marvelous. Requires no special expensive equipment.

For full details write today for folder MPL-28 to

WARREN-KNIGHT CO.
Scientific Instruments and Supplies
136 North 12th St., Philadelphia, Pa.

QUALITY
SMP
"Distinguished Moulders of Synthetic Plastics"

SYNTHETIC MOULDED PRODUCTS
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Stonington, Connecticut
NEW YORK CITY: 303 FIFTH AVE.
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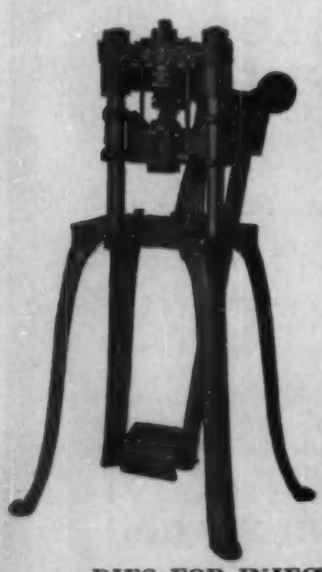
"STANDARD"
LITTLE GIANT TOGGLE PRESS



Constructed on the lines of a power press, our Toggle Press fills the gap between the small hand lever press and the large power press. It will take a great majority of the work that is done in a large power press, such as one operation dies for brush back shells, trays, buttons, buckles, etc.

It has a long stroke, a lot of power, and a wide working range. The head is equipped with knock-out. All wearing parts, pins and links are hardened.

Price and specifications on request.

* * *

We manufacture complete equipment for the working of Celluloid, Catalin, Tenite and similar plastic materials.

Send for our Catalog "F"

DIES FOR INJECTION MOLDING

STANDARD TOOL COMPANY
73-75 WATER ST.
LEOMINSTER, MASS.

BOOKS and BULLETINS

Booklets reviewed in these columns will be sent without charge to executives who write for them on their company letterheads. Other books will be sent postpaid at the publishers' advertised prices

Beetle

American Cyanamid Company has issued a 48-page hard cover book illustrating and describing Beetle and Beetle products. A chapter on molding gives information on preforming and molding cycles, temperatures, molds, pressures, cures and finishing operations. Another chapter is devoted to the properties of Beetle. Still other chapters are given over to applications in general and especially in the lighting field. The book is well illustrated and graphs are included to show the behavior of Beetle under various conditions. The cover is distinguished by an insert of the American Cyanamid Company's trade mark molded in ivory Beetle and blue.

What is Bakelite?

So many people have asked this question that the Bakelite Corporation has issued a 16-page booklet titled "The Versatile Service of Bakelite Materials," in which the story of the development of various Bakelite resinous materials, their general characteristics, their properties and applications appears.

Methods of manufacture are described in the simplest terms and cast resinoids, molding materials and laminated products are explained in a way that the layman can understand.

Liquid products of the heat hardenable type, synthetic resins for air-drying finishes, wood adhesives and special resinous materials are similarly treated to explain and identify the general classifications and uses of Bakelite resinous materials.

Resinox molding material

The Resinox Corporation, whose book for molders was announced last month, has published another, called Resinox Molding Material, which illustrates to consumers of plastic products just how they can use this material to advantage. It is well illustrated with all sorts of industrial, commercial and decorative applications; and pictures of the Resinox Laboratory and plant. There is a brief description of how the material is made; a chapter on Mold Design; and one on How Resinox is Molded; with illustrations of the machinery required. This edition is designed for the buyer of plastic parts.

Neoprene handbook

Neoprene, an engineering material with rubber-like properties, yet one which resists the deteriorating effects of oil, heat, sunlight, chemicals and oxidation, is described in detail in a new handbook published by Rubber Chemicals Division, E. I. du Pont de Nemours & Company. This presentation considers separately the effects

of various types of oils, acids, sunlight, heat and other forces which result in rapid deterioration of rubber products and indicates the type of service which may be expected with a similar part of Neoprene.

Specific applications of Neoprene, including hose, electrical cable, molded parts, extruded material, sheet goods and gaskets are also described, with data on reasons for the use of synthetic rubber in these applications. Of special interest is a summary of the method of manufacture and the chemical composition.

Silent gears

Continental Diamond Fibre Co. is distributing an 8-page folder which describes Celeron Silent Gears. These gears are constructed of laminated phenolic materials for a variety of applications which are illustrated and described. Horsepower requirements, rating, and other tables provide useful data to users of silent gears.

Styled by Van Doren

Harold Van Doren and Associates have issued a folder which pictures some of the more important designs they have recently created and gives a classified list of the clients they have served. Among their prominent successes in the plastics field are the Enterprise Meat Chopper housing and the Toledo scale.

Catalin buttons and buckles

A thirty-four page booklet issued by the Catalin Corporation tells, "How Catalin Buttons and Buckles Are Manufactured." It describes the machines which are used, illustrates them and shows the various operations such as roughing, cleaning and polishing, which are incidental to the fabrication of such articles.

Du Pont price list

The quarterly price list of the R & H Chemical Department of E. I. du Pont de Nemours & Co., Inc., was issued in July and contains a listing of the various chemicals produced by this company for all industries.

How to Run a Lathe

The 33rd edition of the machinists' manual, "How to Run a Lathe," has recently been announced by its publisher, The South Bend Lathe Works and has 160 pages containing the latest and most authoritative information about the fundamental operations of modern lathe practice. Instructions on various phases of lathe work are given in detail in easily understandable language and accompanied with more than 300 illustrations.

Besides dealing with all types of lathe work and showing the proper set-up for doing every kind of a lathe job, the book also includes a great amount of useful shop information of a general nature, such as: reference tables, formulae, and application of lathe tools, etc. Copies are priced at 25¢ each, and will be mailed postpaid anywhere in the world.

EXPERIENCED MOLDERS RECOMMEND:

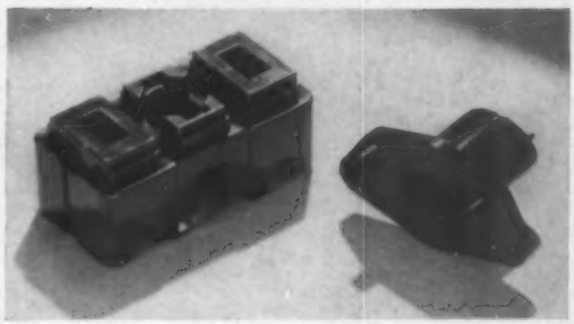
A Gas-Fired Boiler for each Press!

THE initial investment is *approximately the same* for individual KANE boilers as for a central system, BUT—
maintenance charges are invariably higher on the more complicated central boiler system
and, with the central system, operating costs stay fixed even though some presses are shut down . . . whereas, with KANE unit boilers fuel is consumed *only* when the press is in service (making it possible to set up a dependable fuel cost of production for purposes of estimating).
Think it over. And, remember—
These multiple advantages are established definitely by plenty of facts that are yours to examine. A note to us brings the data promptly to you. And, there's no obligation at all.

MEARS-KANE-OFELDT INC.

Executive Offices and Factory
1903-1915 EAST HAGERT ST., PHILADELPHIA
Branch Offices or Distributors in Principal Cities

BETTER PLASTICS



For the past eighty-one years thousands of manufacturers have found that they gain a great advantage when they specify Waterbury Plastics. Given a choice of any of the accepted commercial compounds and the finest of skilled craftsmen who have the greatest and longest experience in the molding industry, they are guaranteed the best. The next time you buy plastic parts call in a Waterbury Plastics Engineer and you too will be sure to get better molded plastics.

PLASTICS DIVISION

THE WATERBURY BUTTON COMPANY
EST. 1812
WATERBURY CONNECTICUT

PLASTIC MOLDING

★

Producers of the finest in molded parts for over 45 years

SHAW

SHAW INSULATOR CO.

Irvington, N. J.

PLASTICS AT THE ASTM MEETING

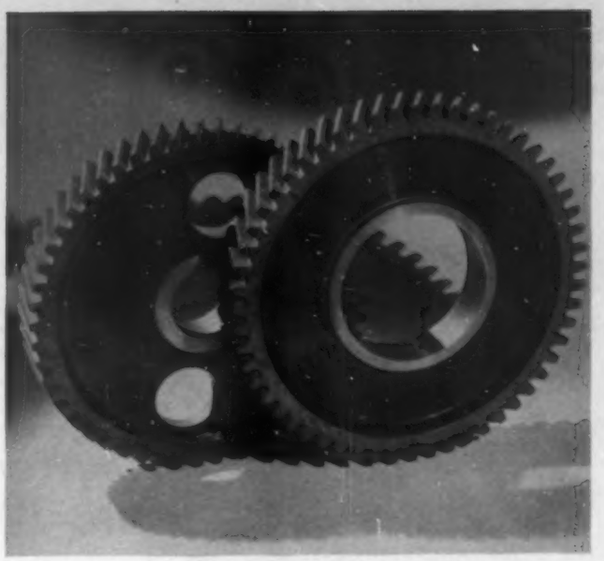
(*Continued from page 39*) facturing Company: T. S. Taylor; Dodge Brothers Corporation: S. G. Saunders; E. I. du Pont de Nemours and Company: P. D. Brossman, H. R. Dittmar, H. W. Paine; Electrical Testing Laboratories: O. Thompson; Esselen, G. J., Consulting Chemist; Fiberloid Corporation: E. A. Wilson; Formica Insulation Company: J. C. Pitzer; General Electric Company: J. R. Hiltner, H. M. Richardson, F. W. Warner; General Plastics, Incorporated: H. M. Crawford; Johns-Manville Corporation: A. B. Cummins; Lafayette College Library: E. C. Bingham; R. H. Macy and Company: Freedman, Ephraim; Masonite Corporation: R. M. Boehm; National Bureau of Standards: W. E. Emley, G. M. Kline; National Carbon Company: L. M. Currie; Otis Elevator Company: M. P. Davis; Owens-Illinois Glass Company: F. O. Anderegg; Pittsburgh Plate Glass Company: E. L. Fix; Plaskon Company: J. A. Bigelow, A. M. Howald; Polytechnic Institute of Brooklyn: W. H. Gardner; Radio Manufacturers Association: A. P. Berejhoff; Rohm and Haas Company: W. F. Bartoe; Tennessee Eastman Corporation: L. W. A. Meyer, C. H. Penning; Ternstedt Manufacturing Division, General Motors Corporation: C. F. Nixon; U. S. Army Air Corps: W. R. Koch; U. S. Department of Agriculture, Bureau of Chemistry and Soils: P. H. Groggins; U. S. Navy Department, Bureau of Engineering: J. B. Lunsford; Westinghouse Electric and Manufacturing Company: R. H. Cunningham, D. Harvey, J. L. Perry.

PAPER AND RESIN

(*Continued from page 23*) Laminated phenolic may be blanked, pierced and shaved on ordinary punch presses. Punches should be a close fit in the dies for best results. When punching stock $^{3}/_{32}$ in. thick and over, it is best to use compound dies. In thicknesses above $^{1}/_{8}$ in. or $^{3}/_{16}$ in., it is advisable to heat the stock from 180 deg. F. to 200 deg. F. before punching.

Allowance should be made for hole shrinkage as follows: In material $^{1}/_{16}$ in. thick, holes will shrink approximately .004 in. in diameter; in $^{3}/_{32}$ in. thick material, approximately .006 in.; in $^{1}/_{8}$ in. thick material, approximately .008 in. and in $^{3}/_{16}$ in. thick material, approximately .012 in. When stock is heated for punching, an allowance of .0025 in. should be made for shrinkage between holes.

Phenolic laminated can be sawn to a smooth edge with a hollow ground circular saw. These saws should be 14 in. in diameter with 110 to 120 teeth, and from $^{1}/_{8}$ in. to $^{5}/_{32}$ in. thick at outer edge. If this special type of saw is not available, any good grade of metal cutting saw will give satisfactory results. The saw should travel at a rate of 2,500 to 3,600 r.p.m. The saw teeth, in addition to being carried at the proper angle, should be square, sharp edged and free from burrs and wire edges. The proper tooth angle is as follows: A straight edge placed on the side of the saw in line with the cutting



Phenolic gears are laminated to shape with bearings and balance holes in molding dies

face of the saw tooth should pass directly through or slightly back of the arbor hole. The rim of the saw should be concentric with the center hole. The temper of the saw should permit sharpening by filing.

Band saws with $5\frac{1}{2}$ points per inch and 19 gauge thickness are used also for good results. Widths vary from $\frac{1}{4}$ in. for scroll work to $1\frac{1}{4}$ in. for heavy sheet sawing. A saw should run from 4,000 to 5,000 linear feet per minute. Band saws should be tempered to permit filing, and should be reset at least every day.

For the drilling of phenolic laminated, the use of high speed drill and high speed drill presses is recommended. Special drills for this purpose are obtainable direct from the manufacturer for ordinary drilling problems. In many cases, however, additional clearance to the twist of the drill may be desirable. The twist should be cut back allowing the cutting edge to remain as it is.

These laminated materials are very dense products and when drilled, produce a large quantity of chips which should be frequently removed from the hole during the drilling operation to prevent the drill from burning. The grinding of a long point on the drill assists in clearing the hole of chips. Sharp drills are absolutely essential if accurate holes are to be produced. Whenever, possible drilling should be perpendicular to the grain or laminations. If it is necessary to drill parallel to the grain, the product should be supported during the operation by means of a clamping device. Drills should be fed slowly. When drilling laminated materials, the hole often closes in slightly due to the resiliency of the material, so it is well to experiment before ordering jigs.

The shearing of sheet stock is easily accomplished by means of the Guillotine type of shear. Regular steel shears may also be used, but to get satisfactory results, the upper shearing blade should be beveled from 30 deg. to 45 deg. Heating the material also provides easier shearing and will give better results, particularly when shearing narrow strips. Some grades of paper base material may be sheared cold in moderate thicknesses. As

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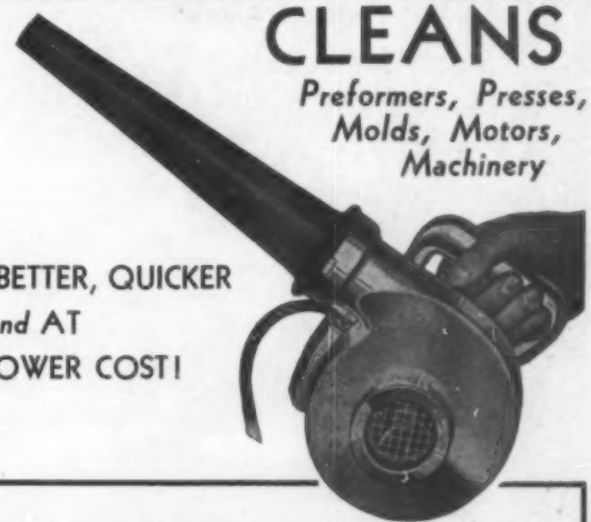

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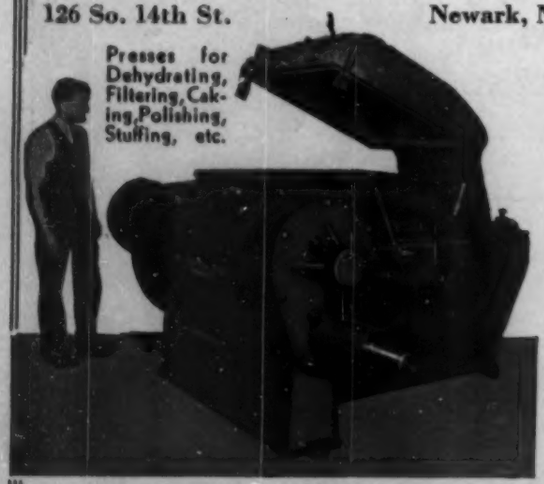

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the thickness increases, however, the application of heat to the stock is usually found necessary. The fabric base grades of material may also be sheared. The canvas and linen grades can be sheared cold in thicknesses up to $^1/_{16}$ in., and with the application of heat, can be satisfactorily sheared in thicknesses up to $^1/_8$ inch.

In milling with standard cutters, high speeds and feeds will give the best results, both as to finish and length of time between grinds. Two bladed fly cutters for form work should be run at higher speeds with slower feed. Use a high speed and coarse feed so that the cutter throws the chips away from the work and keeps cutting, thus avoiding excessive rubbing action which heats and dulls the cutting tool quickly. For deep slots, use side milling cutters as the material will bind if straight side cutters are used. Planing may also be done. Use high speed and coarse feed as in milling, taking a deep cut which should never be less than $^1/_{16}$ inch.

Phenolic laminated materials may be turned with sharp tools with plenty of clearance. These materials are extremely hard and tough, and for this reason, it is desirable to keep the cutting edges in good condition for best results. Also as they are slightly elastic, they are inclined to impinge against the back of the tool thereby generating heat with a consequent dulling of the cutting edge—the reason why ample clearance is essential. As a general rule, the tools should be ground about the same as for cutting brass. They should be turned at peripheral speed 30 percent faster than cast iron, using a course feed and a wide-nosed tool. No lubricant is needed.

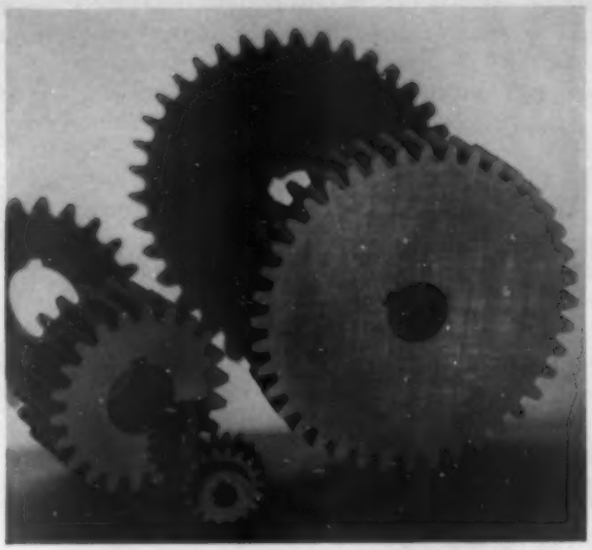
It is difficult to ream phenolic laminated with ordinary tools, as two or three holes will dull the reamer and the holes will not be to size. Fair results can be obtained with an expansion reamer using slow speed and fast feed. Better results can be had by using a floating reamer which centers itself with the work.

These materials may be satisfactorily tapped. In tapping paper base phenolics, it is desirable to use a drill which is about .004 in. over size on the basis of any standard tap. This practice prevents the tap from breaking, and provides a very good thread. The fabric base grades may be drilled with the drill size required for the standard tap.

When phenolic laminated is desired for stamping, it should be so specified. Good stamping stock should not have a high gloss finish. High luster stock is very surface hard and not particularly well adapted for this purpose. Stock to be stamped should be of uniform thickness within .005 in. total thickness variance. The stock should be slightly warmed.

Phenolic laminated will engrave equally well with a compression press or an engraving cutting tool. When the former is used, it is advisable to have the impression dies heated to about 250 deg. to 300 deg. F., applying the pressure by a hand lever, slowly.

Even these simple indications of the methods of fabricating phenolic laminated materials will suggest uses perhaps in your own production to which they are suitable. It must be remembered, however, that there are many grades of the material, each of which has been de-



Such gears are cut by conventional methods from laminated phenolic stock with canvas base

veloped with specific characteristics to make it suitable for a definite application or type of application and when laminated materials are specified—all the facts pertaining to the parts to be fabricated should be made available to the material manufacturer from whom the material is to be obtained. In this way only can satisfactory results be assured.

COLD FLOW OF INSULATING MATERIALS

(*Continued from page 42*) bottom normally indicating either a yield point or elasticity. A cylinder of this material in a parallel plate plastometer will exhibit an immediate change in height depending on the usual elastic manner upon its modulus of about 250,000 lb. per sq. in. This is followed by flow of the rubber. If the load is then removed and the cylinder exposed to a somewhat higher temperature to hasten the process, elastic recovery will take place, and this will be quite independent of the time which may have elapsed between removal of the load and exposure to high temperature.

Typical test results on a specimen of hard rubber 0.4375 in. in diameter and with a load of 500 lb. at 160 F. (71 C.) is as follows:

Height of specimen at start	0.375 in.
Height of specimen after 3 days	0.201 in.
Height of same specimen after pressure is removed and subjected to 212 F. (100 C.) for 5 min.	0.350 in.

The elasticity recovery under the influence of one elevated temperature is 86 percent of the total deformation.

Another specimen of the same volume but of greater diameter and less height gave a curve on log-log paper displaced considerably from that of the specimen just mentioned. This also is a strong indication that the bend in the curve is due to an elastic component rather than to a yield point. The parallel plate analysis is not yet, however, developed to the point where the viscous, plastic

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and elastic constants of such a plastico-elastico-viscous material can be completely and difinitely determined.

To show that the elastic recovery of this material is a very real tendency, it has also been found that if a load of 1,000 lb. is put on a specimen of hard rubber in the form of a $^1/_2$ in. cube maintained at 120 F. (49 C.) for a few days, and is then diminished by say 500 lb., there is an immediate slight recovery of the specimen of an amount determinable by the usual Hooke's Law relations, using an elastic modulus of 250,000 lb. per sq. in. Following this there is a further slow recovery the material actually lifting the 500 lb. weight.

While not rigorously arrived at, the assumption is made for laboratory and production tests of hard rubber that the average rate of flow at 120 F. (49 C.) for 24 hr. of a $^1/_2$ in. cube or pile-up with a load of 1,000 lb. is indicative of the quality of the material. This has been borne out in practice, and has been extended to other materials with the additional provision that in the case of a material which in addition to cold flow is subject to dimensional changes with changes in moisture content, a preconditioning shall be given. This applies particularly to materials which are partly fibrous such as phenolic molding compounds and phenol fiber, where the deformation is a combination of flow and shrinkage.

The cold flow test, conducted for 24 hr. has proven quite satisfactory in predicting service behavior of insulators. A few years ago we were informed that during the summer certain installations of hard rubber telephone jack strips, in which springs were mounted, deformed under the heat and the bending moment exerted by the springs until the springs no longer made effective contact with the plugs. A section of the hard rubber mounting tested in the manner described above showed a rather large amount of deformation in 24 hr. An improved hard rubber with only a fraction as much flow prevented the same occurrence in future jacks. Relays and many other pieces of apparatus have pile-ups of springs and insulators. The functioning of the apparatus often depends upon the maintenance of alignment of the springs, even when they are subjected to considerable force. Phenol fiber is most often used for these pile-ups, and it has been found that the greater the combined flow and shrinkage, the poorer the service behavior of the apparatus, manifested in loosening of the assembly.

The apparatus with which we measure cold flow consists essentially of a lever arranged as shown in Fig. 1, with a 10–1 ratio, with force on the specimen adjustable from the 30 to 1,000 lb. The testing apparatus is mounted within a chamber which is maintained at 120 F.

The specimens are in the form of $^1/_2$ in. cubes or pile-ups of $^1/_2$ inch squares if the material is thinner than $^1/_2$ in. and are put without previous heating in the machines in order to get an initial reading before flow at 120 F. starts. We usually use a temperature of 120 F. as representing the highest normal room temperatures likely to be encountered. The change in percent in the height of the specimen in 24 hours at 120 F. (49 C.) with a load of 1,000 lb. is the figure taken as showing the cold flow value of the material. Typical values are:

Material	Cold Flow
	%
Ebony asbestos	0.2 %
Phenol plastics	0.4 %
Urea plastics	0.4 to 7 %
Hard rubber	0.5 to 80* %
Vinyl plastics	1.0 to 32 %
Cellulose acetate plastics	2.0 to 64 %
Polystyrol	2.0 to 22 %
Acrylic resins	1.0 to 50 %
Cast phenolics	10.0 %
Benzyl cellulose	76.0 %

* Good commercial hard rubbers have a cold flow of 5 percent or less.

From our detailed studies of cold flow phenomena, we conclude that methods of parallel plate plastometry are of fundamental importance in determining the class in which a given material falls, but are too laborious and complicated for engineering or production control. The test we have described, in which the 24-hr. deformation is taken, although an empirical one, has proved an accurate and reliable method of evaluating insulating materials subject to deformation under heat and pressure.

We venture to hope that the brief discussion herein will help to stimulate a closer attention to cold flow by all those interested in precise operation of electrical apparatus over long periods of time. We believe the American Society for Testing Material and the Society of Rheology should take definite steps to properly define cold flow phenomena and to investigate suitable methods for their determination and control.

FILMS AND SHEETING

(*Continued from page 40*) heat or pressure, but is far more responsive to variations of absorbed water.

Cellulose ethers are now appearing on the market as a material for the manufacture of both sheeting and molded products. Ethyl and methyl cellulose are now available in commercial quantities, and benzyl cellulose will follow if the demands of the trade warrant it. These products are unique in many respects and will fulfill the requirements for certain applications for which most other compositions are unsuited. They are exceedingly tough, of high tensile strength, transparent, readily plasticized, and thermoplastic. They dissolve in a large number of solvents including the low priced aromatic hydrocarbons. They are very compatible with most fatty oils and resins, and even waxes.

Among the newcomers into the field of transparent sheeting are rubber hydrochloride, and rubber chloride. These products fabricate into clear transparent tough flexible films which unlike rubber show no elasticity. They remain plastic and flow under heat and pressure. The sheeting can be laminated by heat and pressure without the use of an adhesive. This type of product is sold under such trade names as "Pliofilm" and "Marbon." Natural and synthetic rubbers are also made into films and sheeting; however these types are translucent to opaque and are elastic rather than plastic, although the

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compositions from which they are produced are plastic during the manufacturing process.

There have also appeared several forms of sheeting made from certain resins. Suitable mixtures of resins composed of polymerized vinyl esters, more particularly vinyl chloride and vinyl acetate, produce a very excellent form of transparent sheeting. The thin films are formed by extrusion of a solution from a slit in a nozzle into a precipitating bath or non-solvent which washes out the active solvent. The film is then dried and the volatile solvent recovered for reuse. The thicker sheeting is made by the fusion or coalescence of the granular particles under heat and pressure between polished platens. These sheets are clear, colorless, transparent, tough, flexible and remain thermoplastic. The resulting sheeting can have its properties readily modified by adjusting the ratio of the vinyl chloride to the acetate. Vinyl chloride is a hard, brittle resin; while the acetate is a soft and flexible resin, and therefore acts as a plasticizer of the vinyl chloride.

Probably the most recent addition to this group of products are the acrylic ester resins. These resins are noted for their marked degree of transparency and complete absence of color. The sheeting now available from one hundredth inch thick and up, is tough and pliable and retains its thermoplastic characteristics.

Because of the demand for a low priced transparent sheeting suitable as a packaging material, the relative cheapness and low cost of processing of certain natural products have spurred workers toward the use of these products. Considerable development work is in progress with real promise of commercial success. As stated above gelatin sheeting has been made abroad and in this country for some time past. More recently a gelatin sheeting coated on both faces with a cellulose ester solution to render it waterproof has been successfully developed. More striking, however, is the new packaging made from casein. This is available plain or coated with waterproof laminations of a cellulose ester. It is practically colorless and completely transparent. Thick sheets of casein have been formed from soluble alkali caseinates and hardened with formaldehyde or the alums. Film made from egg or blood albumin has not yet reached this state of development. Other proteins also offer possibilities. Zein from corn may be processed and formed into sheeting. Of greater promise is the large quantity of low cost proteins from soy beans. When this product is properly processed and fabricated into sheeting, it will make available a type of transparent material of very low relative cost and useful for many applications not requiring the properties of the previously mentioned more expensive materials.

Natural organic materials other than the proteins form self-sustaining transparent films. The most conspicuous group is that of the carbohydrates. Cellulose regenerated is the premier in this class. However, starch and starch derivatives form excellent transparent self-sustaining films. Hydrated starch plastic cast into film form, dried and coated on both sides forms the lowest price transparent waterproof film yet produced.

Most of the products which enter this field usually have their beginning as coating films and are finally developed into self-sustaining films by stripping them from the surface upon which they were formed. This applies more specifically to the type of films used for packaging and the like. The self-sustaining characteristic is more readily achieved in the thicker films.

It is believed that many readers will be interested in the following list of American producers of the above described products.

Manufacturer	Location	Trade Name
Cellulose Nitrate		
Celluloid Corp.	Newark, N. J.	Celluloid
E. I. Du Pont de Nemours and Company	Arlington, N. J.	Pyralin
Eastman Kodak Corp.	Rochester, N. Y.	Kodafilm
Fiberloid Corp.	Indian Orchard, Mass.	Fiberloid
Nixon Nitration Wks.	Nixon, N. J.	Nixonoid
Regenerated Cellulose		
Du Pont Cellophane Co.	New York, N. Y.	Cellophane
Sylvania Industrial Corp.	New York, N. Y.	Sylphrap
Visking Corp.	Chicago, Ill.	Visking
Cellulose Acetate		
American Products Mfg. Co.	New Orleans, La.	Inceloid
Celluloid Corp.	Newark, N. J.	Protectoid and Lumarith
E. I. Du Pont de Nemours and Co.	Arlington, N. J.	Plastacele
Eastman Kodak Co.	Rochester, N. Y.	Kodapak
Fiberloid Corp.	Indian Orchard, Mass.	Fibestos
Tennessee Eastman Corp.	Kingsport, Tenn.	Tenite
Transolene Corp.	Barrington, Ill.	Transowrap
Cellulose Ethers		
Dow Chemical Co.	Midland, Mich.	Ethocel
Hercules Powder Co.	Wilmington, Del.	Ethyl & Methyl
Zein		
American Maize Products Corp.	Chicago, Ill.	
Starch (coated with cellulose nitrate)		
American Products Mfg. Co.	New Orleans, La.	Carbofilm
Vinyl Resins		
Carbide & Carbon Chem. Corp.	New York City	Vinylite (vinyl chloride and vinyl acetate)
Acrylate Resins		
E. I. du Pont de Nemours and Co.	Wilmington, Del.	Lucite (Methyl methacrylate)
Röhm and Haas Company	Philadelphia, Pa.	Plexiglas
Rubber Hydrochloride		
Goodyear Tire & Rubber Co.	Akron, Ohio	Pliofilm
Marbon Corp.	Chicago, Ill.	Marbofilm
Rubber Composition		
Marathon Paper Mills	Rothschild, Wis.	Parafilm (Rubber and Paraffin)
Gelatin		
Brigham Sheet Gelatin Wks.	Randolph, Vt.	
Marsene Transparent Paper Co.	Gary, Ind.	Marsene
S. W. Weis, Inc.	Chicago, Ill.	(Gelatin coated with cellulose nitrate)

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